CHEMICAL INDUSTRIES

.. the business magazin[e]

for makers

and users

of chemicals

Management • Research • Production • Marketing

Volume 45 Number 2

Contents for August, 1939

Editorials

Power and Plants—Patents Once More—What Price Glory—Wealth from Waste 131

Feature Articles

Abrasives, 1918-1938 By Frank J. Tone 133

Rubber and Its Substitutes—A Collaboration By Gustavus Esselen, Inc., Arthur D. Little, Inc., and Skinner & Sherman, Inc. 140

The Pulse of Opinion—Should Chemists Be Licensed? A symposium 147

Wealth From Waste By H. O. Chute 150

Plant Operation and Administration

Evaluating Corrosion-Resistant Materials By J. M. W. Chamberlain 161

Booklets and Catalogs 166

New Equipment 167

New Chemicals for Industry

Textile Manufacturers Are Becoming "Waterproofing Conscious" By Harold A. Levey 168

New Processes, New Products 170

Chemical Specialties for Industry

Improved Formulation of Upholstery Cleaners By Charles F. Mason 171

New Products—New Packages 172

The Importance of Oxidation Inhibitors By Benjamin Levitt 173

New Specialties of the Month 174

News of the Month in Review

Monopoly Committee's Report on Patents 185

The Chemical Markets 189

Prices Current 204

Part 2: Statistical and Technical Data Section

Current Statistics—Business Trends 225

Chemical Stocks and Bonds 227

Dyes, Synthetic Chemicals, 1938 229

Pigments, Fillers, 1938 231

Digest of U. S. Patents 233

(Index to Advertisements . . . Page 222)

What's Coming!

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Consulting Editors

R. T. Baldwin, L. W. Bass, F. M. Becket, B. T. Brooks, J. V. N. Dorr, C. R. Downs, W. M. Grosvenor, W. S. Landis, and M. C. Whitaker.

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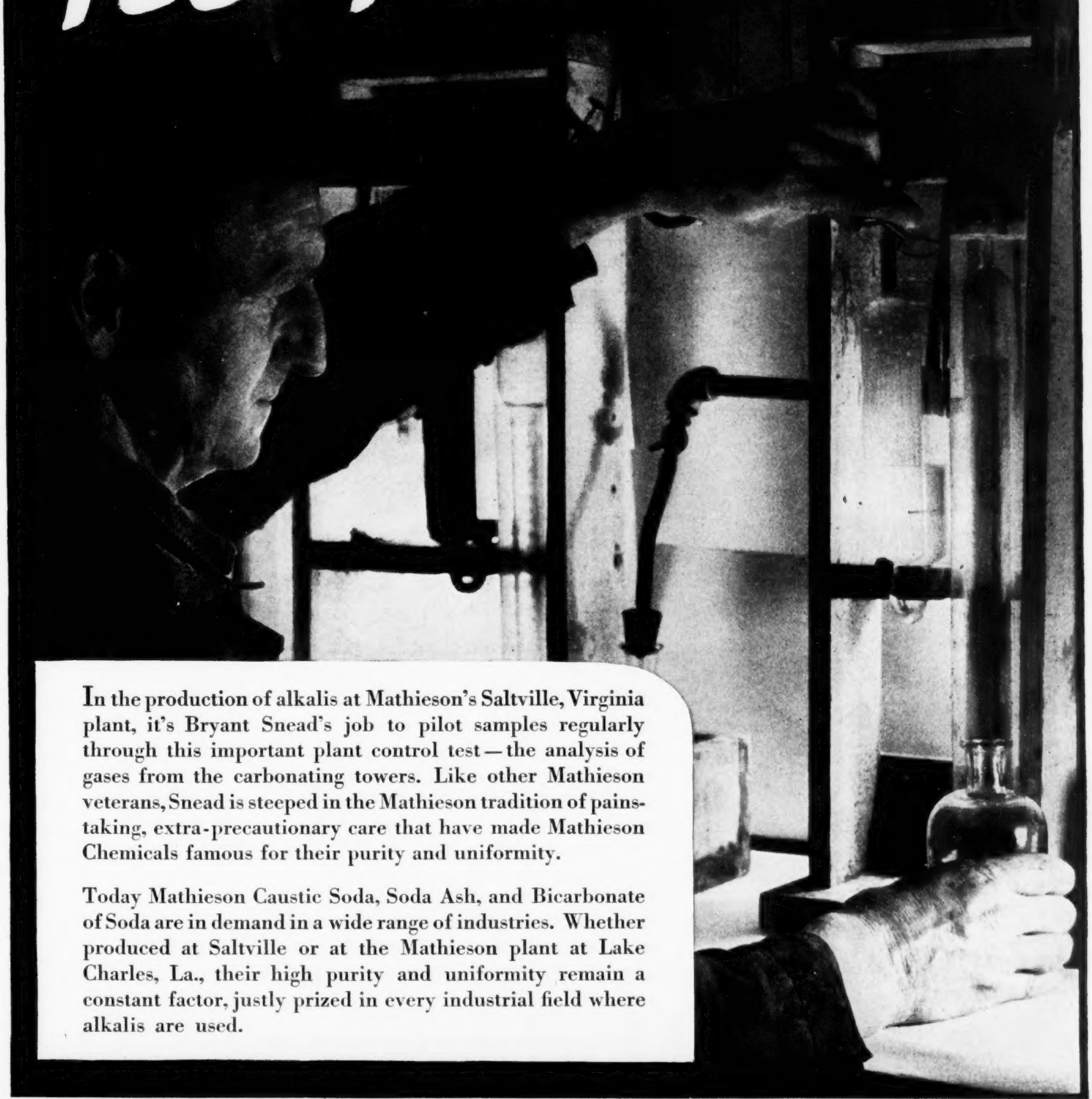
TEST PILOT



In the production of alkalis at Mathieson's Saltville, Virginia plant, it's Bryant Snead's job to pilot samples regularly through this important plant control test—the analysis of gases from the carbonating towers. Like other Mathieson veterans, Snead is steeped in the Mathieson tradition of painstaking, extra-precautionary care that have made Mathieson Chemicals famous for their purity and uniformity.

Today Mathieson Caustic Soda, Soda Ash, and Bicarbonate of Soda are in demand in a wide range of industries. Whether produced at Saltville or at the Mathieson plant at Lake Charles, La., their high purity and uniformity remain a constant factor, justly prized in every industrial field where alkalis are used.

Mathieson Chemicals

THE MATHIESON ALKALI WORKS (INC.)
60 E. 42ND STREET, NEW YORK, N. Y.

SODA ASH . . . CAUSTIC SODA . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . BLEACHING POWDER . . . HTH PRODUCTS . . . AMMONIA, ANHYDROUS and AQUA . . . FUSED ALKALI PRODUCTS . . . CCH (INDUSTRIAL HYPOCHLORITE) . . . DRY ICE . . . LIQUID CARBON DIOXIDE . . . ANALYTICAL SODIUM CHLORITE

The Reader Writes:—

Blue Coal Patents

In a recent Calco advertisement in which we mentioned the assistance given by our Technical Service Department on the problem of the coloring of coal, we stressed the work we had done in selecting the proper type of pigment and method of application.

The basic patent covering the general proposition of coloring coal was taken out by Dr. Gustavus Esselen, under U. S. Patent No. 1,688,695, assigned to the D. L. & W. Coal Company. Through an oversight, the existence of this patent was not mentioned in our advertisement.

August Merz, *Vice-President*,
The Calco Chemical Company, Inc.
Bound Brook, N. J.

Winning Security

The yearning of the generation is for security—upon the labor of others. The urge is for security in high places and in low and for the steam heated life—while the working factory hand, the laboring mechanic and the struggling business house carry the load.

The surviving adventurer and pioneer in the field of industry—the man with the gleam of creation in his eye and perspiration upon his forehead is a lonely and a rare figure. His pursuers and legislative persecutors have almost cut him down. Yet with him and his works all prosperity begins.

The men who made industrial America —employers and employees alike—are nearly all in the graveyards. In spite of their detractors they were in the main a hardy— a proud—and an adventurous race. They came, they saw and they conquered not only the wilderness—the rivers and the mountains but the laws of chemistry, physics, mechanics and finance as well. With these men, America rose to the industrial heights. Those who are now coasting upon its decline are everywhere about us—hovering around this industrial giant of yesteryear—living off its ebbing strength—and listening to the gospel of fear, idleness and phantom security being preached by self-seeking quacks with no records of their own.

Sensing this popular wave, some office holders, some educators and others who live upon the public's back see security for themselves in catering toward this growing parade labeled "security." It leads away from the spirit of commercial adventure—away from personal ambition—and away from labor of the heart and the hand and the mind.

There is a genuine joy in physical labor. There is a sense of creation and daring in the world of industry and commerce and construction about us. And whether we accept it or not, there is very little of security either in health or fortune or in our days upon earth. We all want protection for the aged and the weak and poverty to vanish from the land. But we are killing the very enterprise which has gone so far to accomplish this in the deluge of taxes and blanks and government clerks created in the attempt.

Until we recover some pride in the labors of hand and mind and give some encouragement to the risk of private fortune which attends them, we shall continue to be an unhappy and a bewildered people. The man who explodes the myth of something for nothing forever as a national craze and who shows clearly the distinction between leisure and unhappy idleness should be made a national hero. He will be the missing link between a colorful past and what could be an adventurous future for this generation in America.

William J. Reardon, *Pres.*,
Reardon Color and Chemical Works
Cincinnati, Ohio

CALENDAR OF EVENTS

Salesmen's Association of the American Chemical Industry, Golf Tournament, Bonnie Briar Country Club, Larchmont, N. Y., Aug. 15.

American Pharmaceutical Association, 87th Annual Convention, Biltmore Hotel, Atlanta, Ga., August 20-26.

American Mining Congress, Sixth Annual Metal Mining Convention & Exposition, Western Division, Salt Lake City, Utah, Aug. 28-31.

22nd Annual Conference on Industrial Relations, Silver Bay (Lake George), N. Y., Aug. 30-Sept. 2.

American Society of Mechanical Engineers, Annual Meeting, Hotel Pennsylvania and Engineering Societies Bldg., N. Y. City, Sept. 4-8.

Electrochemical Society, Fall Convention, Hotel Commodore, N. Y. City, Sept. 11-13.

A. C. S., 98th Meeting, Boston, **Mass., Sept. 11-15.**

National Petroleum Association, Atlantic City, N. J., Hotel Traymore, Sept. 13-15.

American Association of Textile Chemists and Colorists. Annual Convention, Copley-Plaza Hotel, Boston, Mass., Sept. 15-16.

American Ceramic Society, White Wares and Materials & Equipment Divisions, Autumn Meeting, Summit Hotel, Uniontown, Pa., Sept. 15-16.

Oil Trades Association of N. Y., Sports Day, Pelham Country Club, Pelham, N. Y., Sept. 19.

National Industrial Advertisers' Association Conference, Hotel New Yorker, N. Y. City, Sept. 20-22.

New Jersey Oil Trades Association, Fall Outing, Sept. 28.

American Gas Association, Annual Convention, N. Y. City, Oct. 9-10.

Packaging Institute, Inc., 1st Annual Meeting, Edgewater Beach Hotel, Chicago, Illinois, Oct. 12-13.

National Safety Congress & Exposition, Atlantic City, N. J., Oct. 16-20.

American Public Health Association, William Penn Hotel, Pittsburgh, Pa., Oct. 17-20.

Porcelain Enamel Institute, 4th Annual Forum, Ohio State University, Columbus, O., Oct. 18-20.

4th Annual Fall Meeting and Golf Tournament, Drug, Chemical & Allied Trades Section, N. Y. Board of Trade, Inc., Skytop, Pa., Oct. 20-21.

National Pest Control Ass'n, 7th Annual Convention, Hotel Pennsylvania, New York City, Oct. 23-24-25.

National Paint, Varnish & Lacquer Association, Annual Convention, Hotel Fairmont, San Francisco, Oct. 31, Nov. 1-2.

Oil Trades Association of N. Y., Annual Banquet, Hotel Waldorf-Astoria, N. Y. City, Nov. 1.

American Petroleum Institute, 20th Annual Meeting, Stevens Hotel, Chicago, Nov. 13-17.

American Institute of Chemical Engineers, semi-annual meeting, Providence, R. I., Nov. 15-17.

American Society of Mechanical Engineers, Philadelphia, Pa., Dec. 4-7.

17th Exposition of Chemical Industries, Grand Central Palace, N. Y. City, Dec. 4-9.

A. C. S., Eighth National Organic Chemistry Symposium, Division Organic Chemistry, St. Louis, Mo., Dec. 28-30.

But We Do Worry

You are giving us more than our money's worth now. So why worry?

Milton W. Davenport,
Davenport & Keeler, Inc.
New Britain, Conn.

Come Up and See Our Diplomas

I think your articles are a little too non-technical now. The approach seems to be by an organization not very familiar with chemistry.

Wadsworth, Ohio Dwight R. Means

Editor's Note: Mr. Means just renewed his subscription to "the chemical business magazine" for three years.

More Household Specialties

Suggest you give more theoretical discussions on the mechanics and chemistry of household specialties. Also more detailed data on products in the specialty field, including surveys on different specialties as to consumer demand.

J. S. Broncato, *Chief Chemist*,
Liquid Veneer Corp.
Buffalo, N. Y.

Editor's Note: A series of articles on several phases of the selection, packaging and merchandising of specialties is being planned for early issues.

Pacific Coast Neglected?

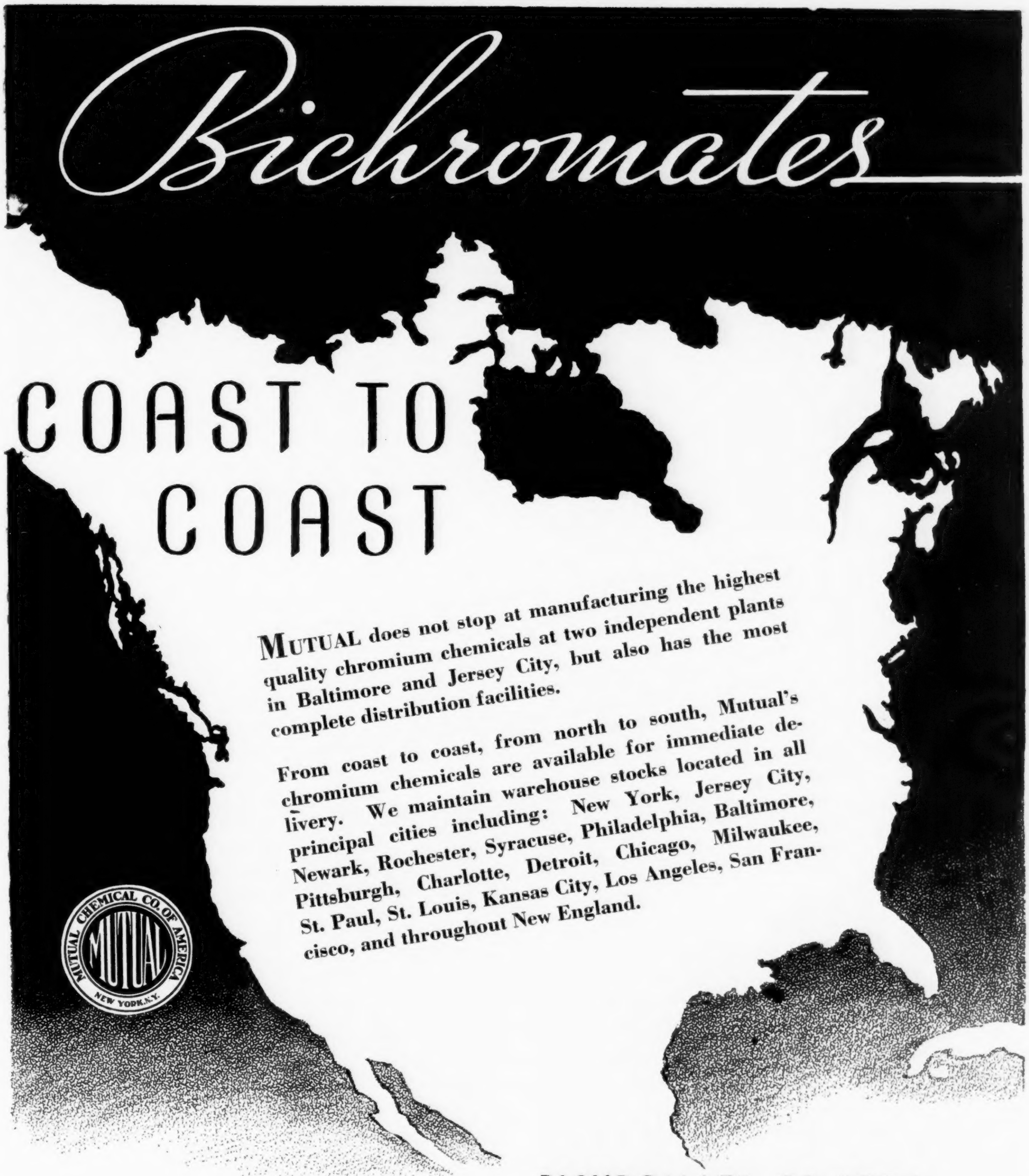
We suggest some news about Pacific Coast industries.

S. L. Abbot, Jr., Co.
San Francisco, Calif.

Couldn't Be Without It

Chemical Industries is fine. Would not want to be in the chemical business without it.

Chas. H. Stanfield, *Sec.-Treas.*
The Western Machinery Co.
Wichita, Kans.

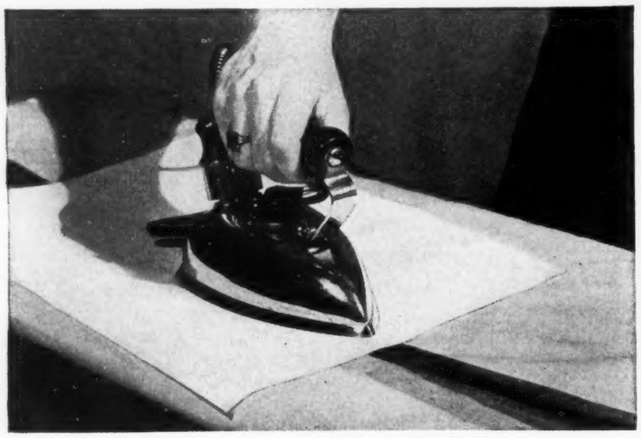


BICHROMATE OF SODA
BICHROMATE OF POTASH
CHROMIC ACID OXALIC ACID

MUTUAL CHEMICAL COMPANY

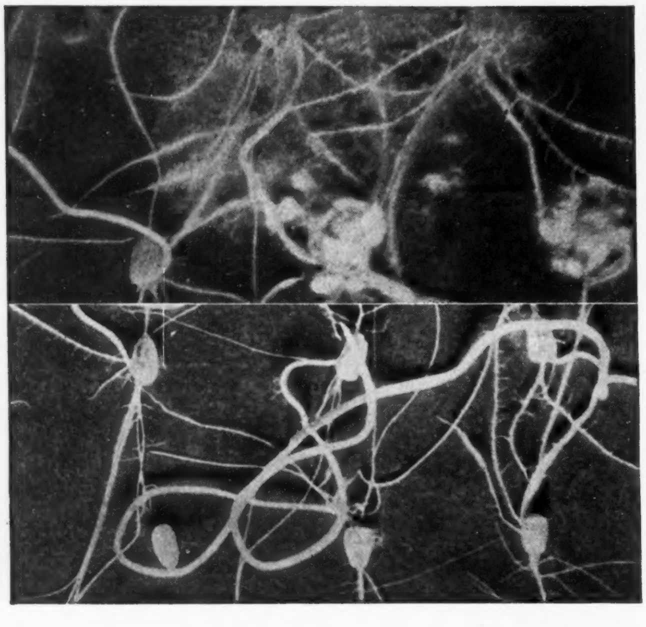
Mutual Chemical Company of America · · · 270 Madison Avenue · · · New York City

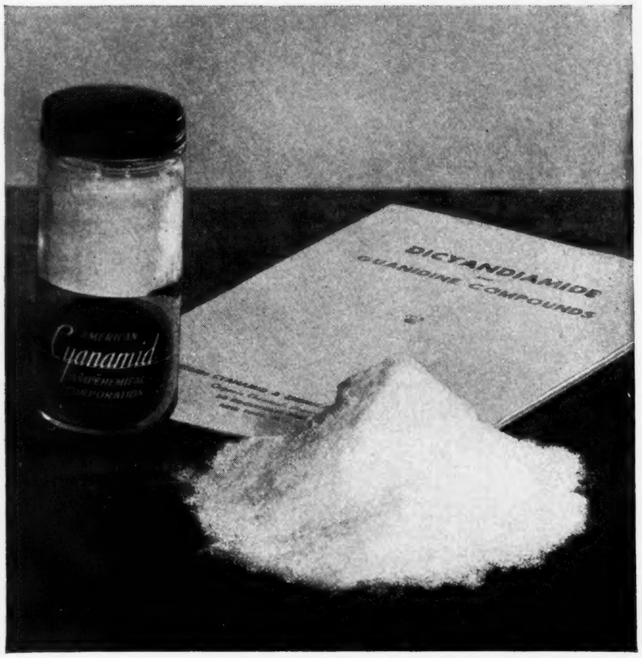
(*Right*) **INTRODUCTION TO CARLOADS** is this sample bottle of Dicyandiamide. Long a chemical curiosity, Dicyandiamide has at last been made commercially available by Cyanamid research—at a price that makes it a *new* product. Possibilities for synthesis through its use in nitrogen chemistry are almost unlimited. Barbituric acid, guanidine salts and resins, pyridimines—these are just a few of the applications of Dicyandiamide. Also commercially obtainable at low cost are Guanidine Nitrate, Guanidine Carbonate, and Guanylurea Sulphate. New booklet, "Dicyandiamide and Guanidine Compounds," is available on request.



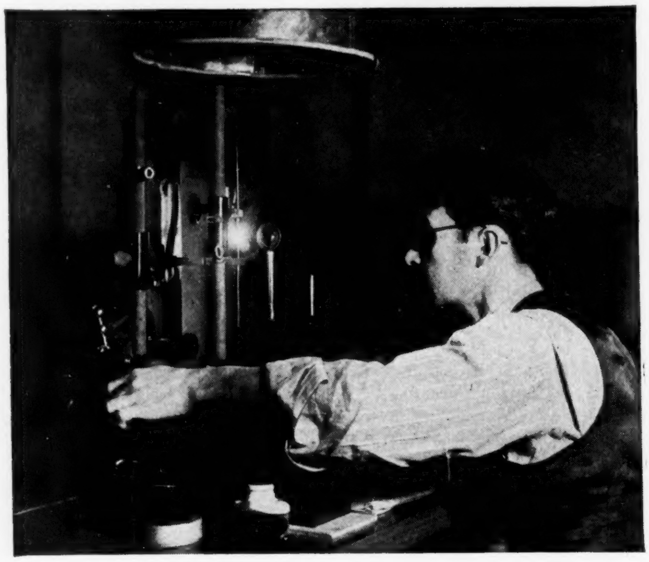
(*Above*) **SEWING WITH AN IRON** is an easy task on fabrics coated with Koroseal—compounded by chemical processes from limestone, coke, and salt. Heat of the iron applied to the coated fabric "sews" the material together as effectively as a needle. Process offers a new way of applying colored strips to form attractive designs. Koroseal is both waterproof and sunproof, and can be applied to paper as well as to fabrics. Its use has been suggested in fabrics for shower curtains and umbrellas. These are just a few of the many possibilities of this synthetic rubber-like material, which has been applied with equal success to the lining of tanks handling severe corrosives, such as nitric or chromic acids.

(*Below*) **BACKYARD GARDENER** and commercial farmer are alike aided by the development of hybrid corn. Produced by in- and cross-breeding, it has increased yields as much as 30%, sometimes more. More prolific, hybrid cornseed is also more expensive. To protect it from ever-present soil-borne diseases, Cyanamid has developed a special hybrid cornseed disinfectant—*Barbak C. Its effectiveness is illustrated by the 7-day old corn plants shown below. Upper photo shows plants from Diplodia infected seed; lower photo, similar plants from Barbak C treated seed.

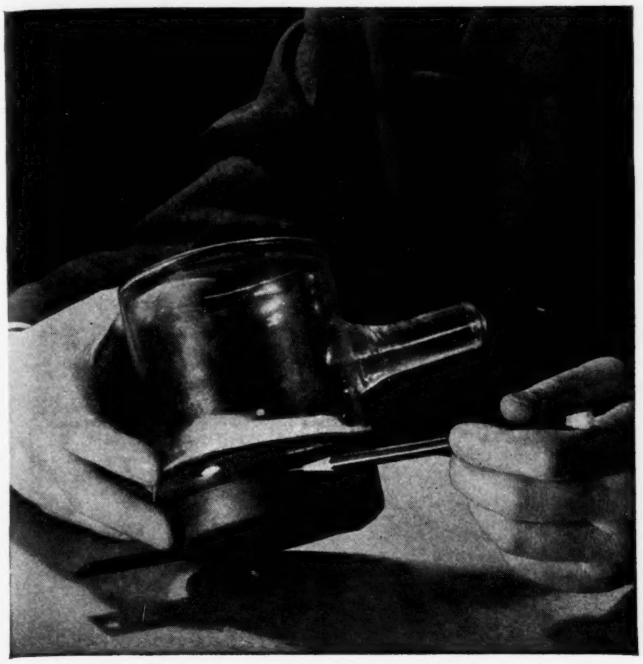




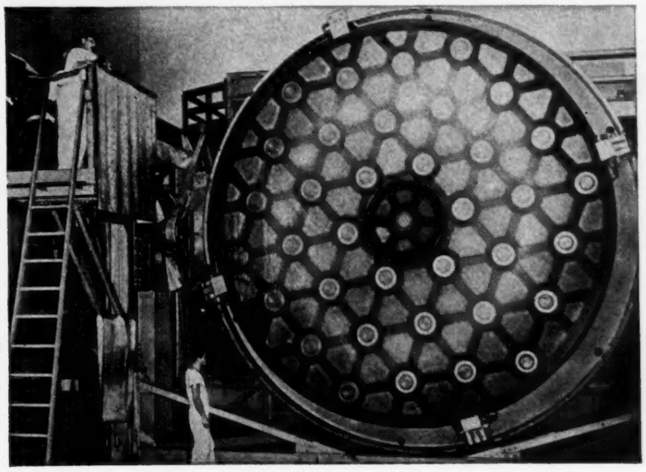
LIFE



(*Above*) **CHEMICALS YIELD THEIR SECRETS** in the flame of a carbon arc as RCA tests every part for absolute accuracy in the manufacture of radio and television tubes. Tubes are delicate scientific instruments made of chemical elements, alloys, and compounds—and each material is carefully prepared, analyzed, and studied during tube development, manufacture, and operation. Spectrographic analysis shown here provides the key to exact chemical composition. Volatilized in arc, each material gives off a light that is refracted by a quartz prism to produce a spectrum that can be photographed. Resulting photograph shows both the nature and the quantity of an impurity in the material undergoing test.

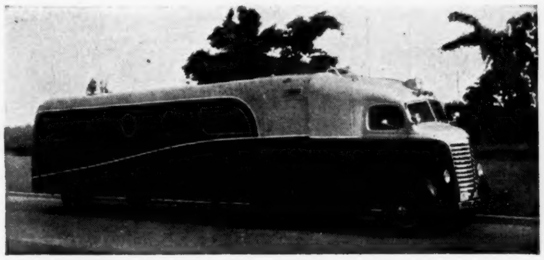


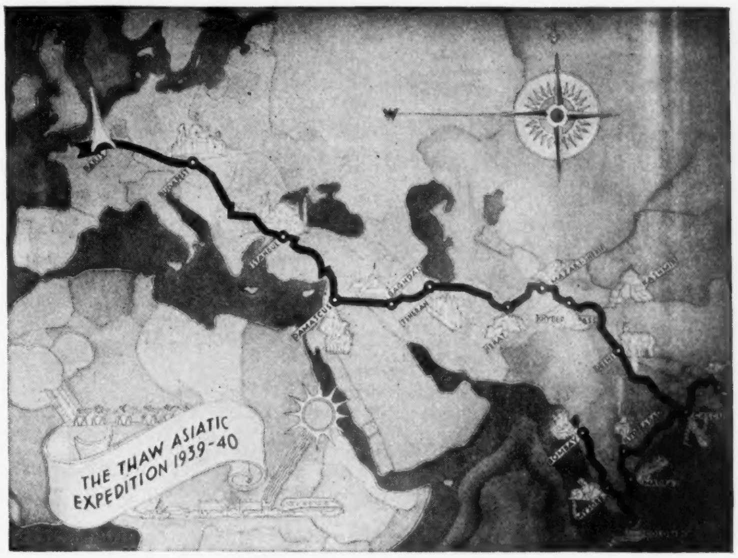
(*Left*) **GUARDIAN OF VACUUMS** is Kovar, new alloy that fuses with glass and expands at practically the same rate, allowing air-tight seals between metal and tube. Product of the research laboratories of one of the country's leading electrical manufacturers, Kovar is an alloy of nickel, cobalt, manganese, and iron. Good conductor of electricity, Kovar leads electric current through glass walls while it maintains the vacuum essential to the operation of radio tubes, rectifiers, and X-rays. Photograph shows Kovar seal in a vacuum device sub-assembly.



ON THE CHEMICAL NEWSFRONT

(*Above*) **GIANT AMONG MIRRORS** is getting ready for its job of reflecting the light of distant stars in the Mt. Palomar telescope. Close-up view of the 200-inch mirror clearly shows the ribbed construction of the glass through the polished surface. Ribs reduce weight and permit rapid equalization of temperature. Hole in center—temporarily plugged for polishing operation—will gather light reflected from an auxiliary mirror to a focus below the big mirror. When completed—late in 1940—the mirror will be coated with aluminum to give it the highest degree of reflectivity—necessary to gather enough light from far-flung space to produce a visible record for the astronomers.





TO BOMBAY BY TRAILER through the strangely-named cities of the East goes the route of the Thaw Asiatic Expedition. Specially designed and constructed by General Motors, the trailer brings to desert and jungle every comfort that modern science can devise. Air conditioning and cork insulation protect the travelers against heat and noise; polaroid glass saves their eyes from the sun's glare. In cool comfort on their long trek, the travelers dine off colorful, light-weight tableware made of Beetle**—ideal for use on trailers and boats because it is non-shattering, hard to break under vibration or shock.

American Cyanamid & Chemical Corporation

30 ROCKEFELLER PLAZA, NEW YORK, N. Y.

*Registered U. S. Patent Office.
**Trade-mark of American Cyanamid Company applied to urea products manufactured by it.

For Many Industrial Uses...

DU PONT REG. U. S. PAT. OFF.

Grasselli SILICATE OF SODA

BECAUSE it can be adapted to meet ever-changing production methods and new product development, GRASSELLI Silicate of Soda is important to industry. It is available to manufacturers in solid form and various solution strengths to meet a wide range of applications.

Among its many uses, GRASSELLI Silicate of Soda is important in the manufacture of enamel frits, coated welding rods and cements, soap, abrasive wheels, detergents, adhesives in the manufacture of box-board and wall-board, sizing paper, wood and fabrics, boiler water treatment, soil stabilization, silk weighting, textile bleaching with peroxides, curing concrete roads.

When your chemical requirements call for Sodium Silicate, specify GRASSELLI. For further information about this and other du Pont chemicals, write to our nearest office.

E. I. DU PONT DE NEMOURS & COMPANY, INC.
GRASSELLI CHEMICALS DEPARTMENT
WILMINGTON, DELAWARE

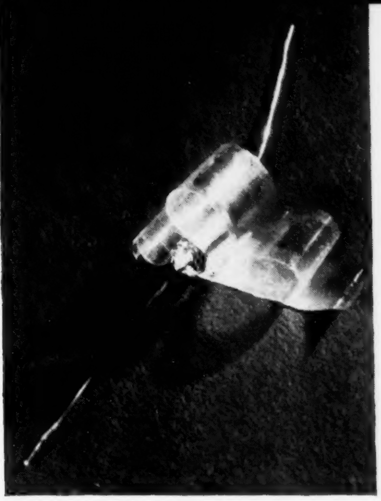
DU PONT REG. U. S. PAT. OFF.

Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Detroit • Los Angeles • Milwaukee
New Haven • New Orleans • New York • Philadelphia • Pittsburgh • Rensselaer • San Francisco • St. Louis • St. Paul
Represented in Canada by CANADIAN INDUSTRIES, LTD., General Chemicals Division, Montreal and Toronto

CHEMICAL INDUSTRIES

The Chemical Business Magazine

Established 1914



Bakelite announces the development of polystyrene film for electrical insulation and other purposes.

Power and Plants

THOSE who know Niagara Falls will, as many of us in the chemical industry do, remember the block after block of well planted streets laid out but yet unlined with buildings. Only the old timers at the Falls recognize these as the ghosts of an ambitious industrial plan to settle there a great number of small unit plants making textiles, shoes, wooden wares and what not. This was all a part of the original Niagara power project, but it never materialized because only those industries that are heavy power consumers find low cost power the determining factor in plant location.

In 1933 David Lillienthal, when the T.V.A. project was launched, expressed this same idea in the following bold prophecy! "The Tennessee Valley is to be the scene of an expansion of industry which, in the course of the coming decade, will change the economic life of the South." Six years of the time have passed and nothing of the kind has ever begun to happen. A few plants that are big consumers of power have been brought in by the bait of cheap rates on large blocks of secondary electricity. But the textile mills and those factories are quite as conspicuous for their absence in the Valley as at the Falls—and for the same reasons.

Census Bureau figures indicate that in the average American industry power costs represent less than 2 per cent. of the wholesale price of the goods produced. So insignificant a figure is not to be considered against proximity to materials or markets, labor supply and wage rates, transportation or banking facilities. All this might have been learned in advance from the proved experience of the private companies, but it would not have been well suited to the ballyhoo of exaggerated public benefits supposed to flow from the vast T.V.W. expenditures of public funds. And now that only a few of the larger corporations have been found able to benefit from the T.V.A. surplus power, that same experience is the conclusive answer to political criticism of a sell-out of public power to big corporations. Thus, both before and afterwards, the experience of the T.V.A. is giving us, not a yardstick to measure power economics, but a fine argument why a democratic government has no place in business activities.

Editorial

Patents Once More

That Congressional Committee with the high sounding title which the newsmen have nicknamed the "Monopoly Investigation" will resume its hearings next month and may be counted upon to continue, not as a fact finding body, but as a sounding board for blank attacks upon the American System. As indicated at their sessions last Spring, the favored points of attack will be advertising and patents which significantly are distinctive and important adjuncts to the success of our American way of doing business. They are well chosen points, not that they are vulnerable, but that their function in American industry may be easily perverted into causes with a popular appeal. Already many of our citizens think hazily that advertising is but an added cost to goods and that a patent is chiefly a device to maintain high prices.

The "pocketbook" reaction to such reasoning is direct, simple and, it follows, is exceedingly effective. In the modern style a demand is created for more regulatory laws to be bureaucratically administered.

Though they enter largely into such big advertisers as medicines and cosmetics, coatings and plastics, textiles and leather goods, chemicals are rarely consumer wares, so the industry's interest in attacks on advertising are vicarious. But patents are the basis of much of our progress, and it is difficult to see how our enormous research programs could continue without their protection of discovery rights. If it is easy for the man on the street to ignore the rights of mental poverty, it is not less easy for him to appreciate the tangible values of more work and greater comfort that have come to the American people through American inventions. Such an appreciation is the logical answer to this masked attack on the system of individual initiative and responsibility.

What Price Glory

Announcement has been made of a new series of postage stamps to honor American inventors and scientists. Many other nations have thus honored their great minds, living and dead, and have even gone abroad for native sons and daughters who have "made good" on foreign soil.

The published list of names of our "scientists" to receive this honor is distinguished by the *excluded* rather than by the *included*. America's foremost scientific mind—Willard Gibbs—is not mentioned, yet no other American has ever reached his stature at home or abroad.

Such names as Crawford Long, Walter Reed and Jane Addams have been included. Without denying this gracious lady's many virtues, we cannot possibly compare her choice with that of Mme. Curie by France and by Poland. Mother Eddy might just as well have been selected.

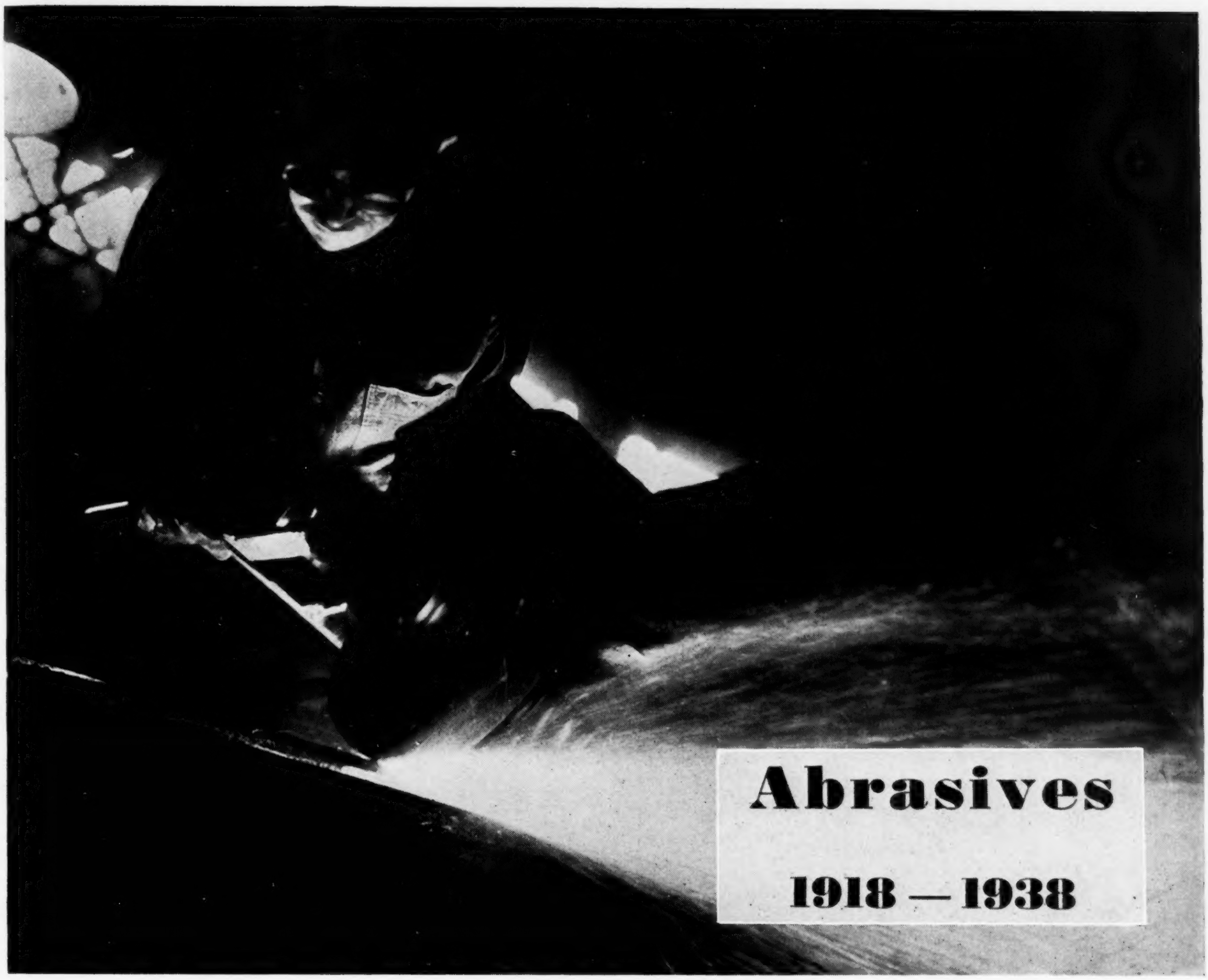
With such illustrious names from which to choose as Dana in mineralogy, Gibbs in physics, Cope in paleontology and Gray in botany, the list of those selected certainly does not truly reflect the glory of American science.

Wealth From Waste

Perhaps the late, beloved Dr. John E. Teeple, were he alive today, might find it necessary to modify or revise his famous remark that "most by-product recovery is the result of injunction." The chemical industry has long since learned the desirability of utilizing even the "chemical squeal" and thoroughly appreciates the possible profit angle of every scrap of waste or by-product. No longer are state health officials the main spark plugs, initiating investigations, looking for ways and means of turning wastes into valuable products. Industry, particularly the chemical industry, has profitably employed much of its research in this direction and if all of the problems, particularly those involving health, have not as yet been solved it certainly is not because of callous indifference.

A history of our modern industrial development would contain but few more highly fascinating chapters than the one written on utilization of wastes. The status of a waste is never static. The waste of yesterday is the profitable by-product of today and tomorrow may become the principal product. As a nation we are being accused of being wastrels, unappreciative of our rich natural resources. To refute this definite accusation, CHEMICAL INDUSTRIES begins in this month's issue a series: "Wealth from Waste"—factual articles by outstanding technologists.

The chemists, engineers and industrialists of this country have every reason to be proud of their accomplishments achieved without artificial stimulus of an autocratic government bureaucracy.



Abrasives 1918 — 1938

By Frank J. Tone

Not readily appreciated is the fact that mass production in the 20th Century has been possible only because of the technical advances made in the manufacture of abrasives. Had not Acheson produced silicon carbide from sand, coke and sawdust, the automobile and the airplane would have hardly reached the present high state of mechanical perfection. Dr. Frank J. Tone, president of The Carborundum Co., and the world's outstanding authority on abrasives, traces the important advances made in that field in the past two decades and indicates what future trends are likely to be.

SILICON carbide and fused crystalline alumina are the companion foundations of the present day abrasive industry. Both are high temperature products of the electric furnace and both are creations of the electrochemist. From prehistoric time man has used natural abrasives such as sandstone to fashion his implements of war and peace, but Acheson belonged to the group of scientists who are not satisfied with the world as they see it but set themselves to the task of improving on the creations of nature. They make new products that nature never dreamed about. Thus did Acheson wring from such ugly things as coke, sand and sawdust the intensely hard crystals of silicon carbide, combining surpassing beauty and great utility, and thus began the present era of manufactured electric furnace abrasives. It may well be said that Acheson's discovery was an advance in the art of greater scope than all that had been accomplished in the previous 25,000 years.

Like many other products of chemical research, abrasives do not reach the average man directly in the sense that he does not eat them nor wear them nor frequently handle them, but they none the less touch his life intimately at many points. Perhaps the most profound effect comes from the fact that they are a key product in what we call mass production. Our present standards of living have been brought about largely through things made available by mass production. In the mechanical arts, mass production is founded on the practice of turning out a vast number of parts which are duplicates, one of the other, and which can be assembled interchangeably. Accuracy is the basis of the interchangeability of parts and the whole concept of mass production of machine parts may be said

to be founded on accuracy. From this idea has grown the mechanical age in which we now live. It has given us sewing machines, bicycles, automobiles, aircraft, radios, vacuum cleaners, typewriters and practically every mechanical device in wide use today. Accuracy in machine parts is attained today solely by the modern abrasive grinding wheel and the precision grinding machine.

The modern grinding wheel is largely the creation of the chemist. It is composed of hard, sharp abrasive grains and bond to hold them together. The strength and cutting properties of the articles made of these abrasives can be modified by varying the type and the amount of bond, the porosity and the size and kind of grit used. Bonds in established commercial use belong to five general types—vitrified (porcelain and glass), silicate (silicate of soda), resinoid (synthetic resin), rubber and shellac.

Plastics have now found their place in abrasive industry in meeting the demand for a grinding wheel revolving at a speed greatly in excess of the normal speed of 6000 S.F.P.M. In many grinding operations efficiency and the amount of material removed increase rapidly with the higher speeds, and synthetic resins, preferably of the phenolic type, are now widely used as a binder in manufacturing the abrasive grains into wheels and other forms. Resinoid wheels are widely used for snagging steel castings, grinding billets and rolls and for cut-off wheels, which are very thin wheels used in the manner of rotary saws.

In snagging wheels the peripheral speed reaches 9,500 S.F.P.M. while cut-off wheels are operated at 16,000 S.F.P.M.

Mass Production

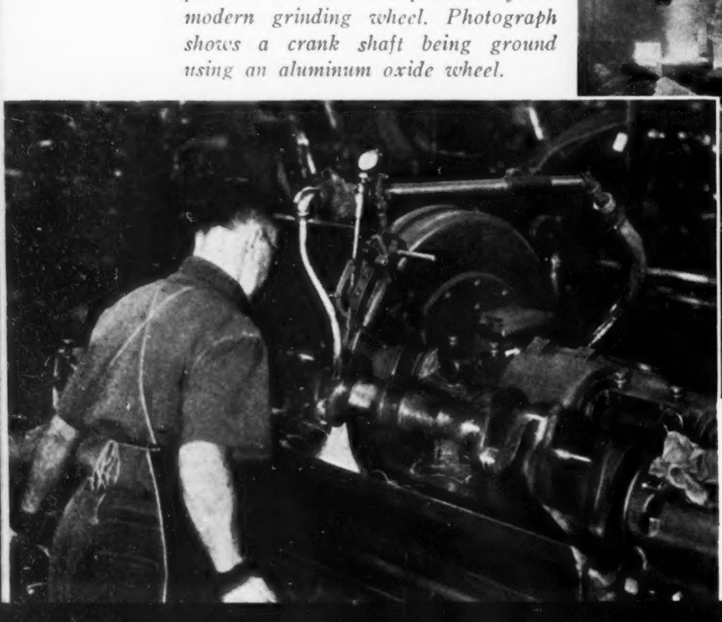
We marvel at the engineering progress of the automobile and airplane, thus far the outstanding accomplishments of the 20th century. The mechanical perfection of the automobile and the interchangeability of its parts have been made possible by the modern grinding wheel. Practically every part of the automobile from the roughest casting to the final coat of paint must be ground with manufactured abrasives at some stage of its manufacture. This expanding industry has required a great multiplicity of abrasive wheels and other grinding tools. We get a better idea of the amount of grinding and finishing necessary to turn out one of the new cars when we consider the fact that the bumper has had nine grinding operations performed on it, the piston pins from seven to ten and the piston rings eight or nine separate operations.

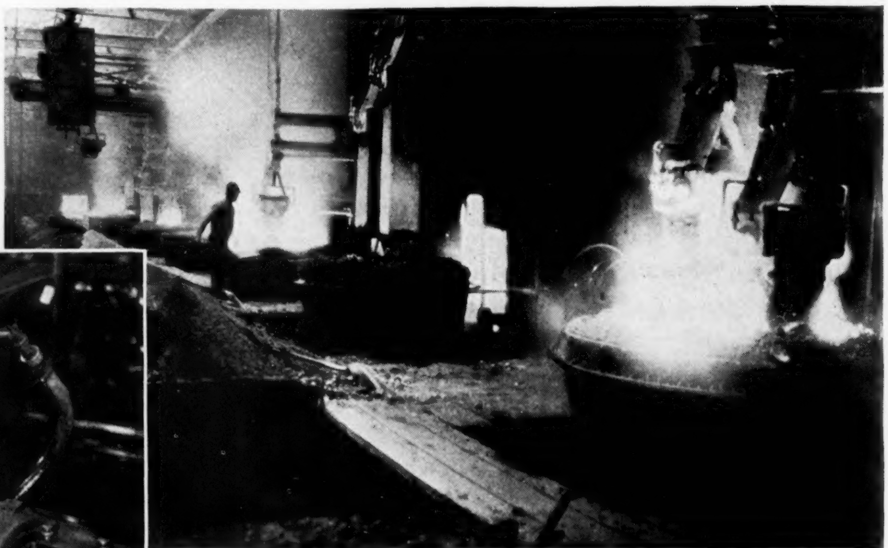
In the airplane, too, every moving part is ground for balance and accuracy, and in the aim to get strength with lightness every threaded part is now ground to a precision fit; in fact, in threaded parts of metal working tools, including even micrometer screws, the grinding wheel has replaced the steel thread cutting tool.

Our great metal working industries are rapidly advancing in the use of harder alloys and harder tools. Step by step they have gone from the high carbon steel of fifty years ago to high speed steels containing alloys of chromium, tungsten, cobalt and the like, all holding full hardness at the actual edge when running so fast as to remain red hot. Now the latest step has been to cemented carbides, such as tungsten carbide. These all present new abrasive problems. The cemented tungsten carbide tools developed in recent years are as hard as the common abrasives available to cut them and this has led to a new type of bonded abrasive wheel containing natural diamonds.

Diamond dust is one of the very oldest of abrasives used for cutting precious stones. Diamond dust had also been rolled into soft metal for abrasive uses but the bonded diamond wheel is a product of the present decade of the abrasive industry. It has solved the problem of dressing cemented carbide tools. In the form of cut-off wheels, it has made possible the preparation of thin petrographic sections. Diamond wheels

The mechanical perfection of the automobile and the interchangeability of its parts have been made possible by the modern grinding wheel. Photograph shows a crank shaft being ground using an aluminum oxide wheel.





A battery of electric arc furnaces at the Carborundum Co.'s plant in which is produced one of the world's most useful abrasives—crystalline aluminum oxide.

will undoubtedly find an increasingly wider field of usefulness.

Cellulose

Cellulose is a raw material of vast industrial importance. In the form of pulp, it is a source of newsprint and other papers, and more recently of cellophane, lacquer and rayon. The advances in the art of paper making have been largely chemical For many years mechanical wood pulp has been produced by grinding logs with natural sandstone In recent years the manufactured abrasive stone has been perfected and has now very widely replaced the natural stones. Their use has resulted in increased production and better pulp.

These stones of manufactured abrasives are made by assembling around a steel center segments composed of silicon carbide or aluminum oxide abrasive grains and a ceramic binder. These segmental wheels are now produced in sizes up to 72 inches in diameter and 54 inches wide, which is the largest grinding unit known today. So we have on one end of the abrasive scale a tiny dental point less than ⅛" in diameter and weighing 1/100 grams for grinding teeth, and at the other end the massive pulp stone weighing over three tons, or sufficient to make a quarter of a billion of the dental wheels.

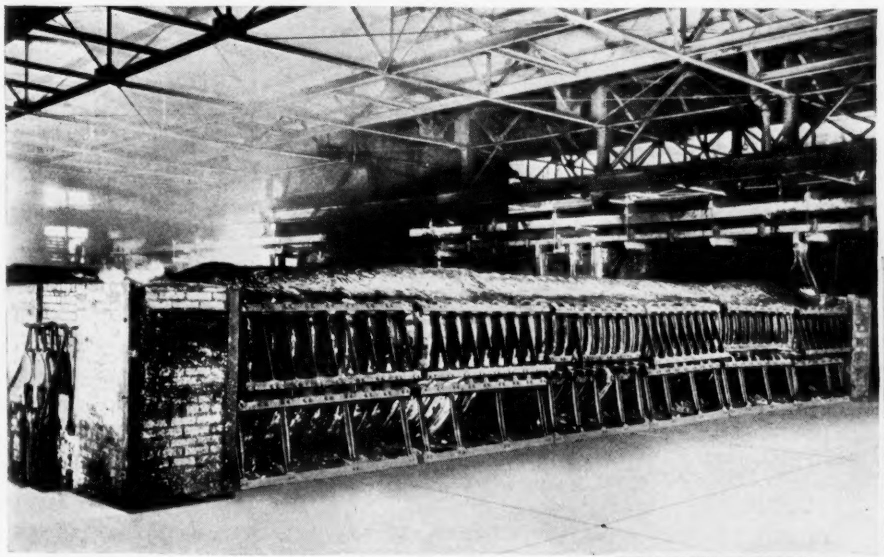
The abrasive engineer is presented by modern industry with an ever changing problem of adapting his products to new materials or of accomplishing new objectives. Prof. C. C. Furnas of Yale has recently stated that the number of metal alloys in present commercial use is roughly equal to the number of stars visible to the naked eye. Each of these metals presents its peculiar problems to the abrasive maker and user. When, for example, chemistry gave to the world a super-steel product known as stainless steel, the difficult job of polishing large sheets of this material was turned over to the abrasive manufacturers, and most successfully solved so that we now have this brilliant resplendent covering for our streamlined trains and our towering sky-scrapers, as well as for the humbler items of household hardware and non-rusting automobile trim.

Even on the more familiar materials the requirements are often extremely exacting, as, for instance, in the grinding of safety razor blades on an automatic machine at the rate of 250 blades a minute where the edges must be so thin that no glint of reflected light can be detected from the edges of a bundle of blades held close under a mercury light. Other examples of extreme requirements are found in the grinding of perfectly tapered ends on microscopic steel pivots for meter bearings or in the production of cutting faces on drill bits which may be 0.010 inch or less in total diameter.

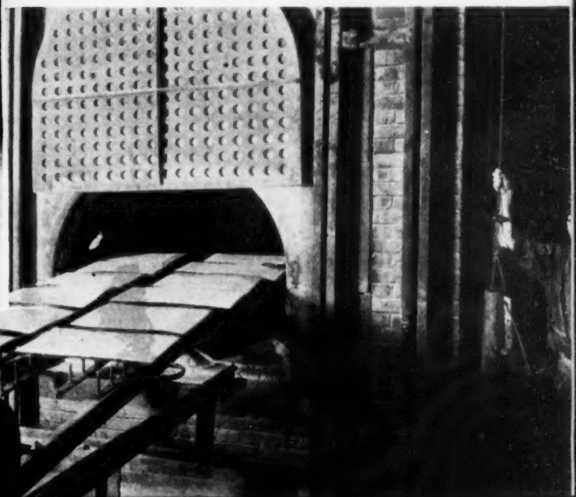
New abrasive wheels and new machines for using them are designed for individual pieces of work whenever the standard tools cannot be used. A very recent example of thus making the tool to fit the job is seen in the grinding of the concrete abutments of the new Golden Gate Bridge at San Francisco. A specially designed planer grinder using a twenty-four inch silicon carbide wheel was used to grind the huge abutments crosswise and lengthwise to an accuracy of one ten-thousandth of an inch, making an almost perfect setting for the nine hundred foot towers, each carrying an estimated weight of 22,000 tons.

Porous Media

The experience of the abrasive maker in the uniform distribution of granular particles in firmly bonded articles, together with certain outstanding chemical and electrical properties of his inherent materials has led him into a number of important allied lines which can be classed with abrasives even though abrasion is not involved. For instance, in recent years abrasives are making a unique contribution in combating disease and safeguarding public health which have always been a



A far cry from the tiny bowl in which Acheson created the first man made abrasive to the present day electric furnaces producing tons of silicon carbide. Mass production of abrasives has made mass production possible in other fields.



Hard materials widely used for abrasives find extensive use also because of their refractory properties. A furnace employing a Carbofrax muffle.

Table 1—Sources and Properties of Abrasives

Abrasive	*Source*	*Chemical Nature*	*Specific Gravity*	*Hardness Mohs' Scale*	*Crystalline Form*	*Applications*
1. Rouge (Red Ocher)	Natural ore (or calcined iron sulfite)	Fe_2O_3 plus clay	5.24	5.5-6.5	Hexagonal	Fine polishing of metals and glass.
2. Flint	Quarried	SiO_2	2.61-2.63	7	Crypto-crystalline	Abrasive coated paper and cloth. Glass grinding. Sand blasting.
3. Garnet	Natural ore	$3FeO.Al_2O_3.3SiO_2$ (almandite)	3.4-4.3	6.5-7	Isometric holohedral	Abrasive coated paper and cloth for woodworking.
4. Emery	Natural ore	$Al_2O_3+Fe_3O_4$	3.75-4.35	7-9	Rhombohedral Hexagonal	Coated abrasive paper and cloth.
5. Corundum	Natural ore	Al_2O_3	3.95-4.10	8.8-9	Rhombohedral Hexagonal	Grinding wheels for malleable iron.
6. Sandstone	Quarried	SiO_2 cemented quartz	2.59-2.64	7	Rhombohedral Hexagonal	Pulp stones. Abrasive coated paper.
7. Fused alumina	Electric furnace from purified bauxite	Al_2O_3	3.93-4.00	9+	Trigonal	Grinding wheels for steel. Abrasive coated paper and cloth. Refractories. Porous media.
8. Silicon carbide	Electric furnace from carbon plus silica	SiC	3.17-3.21	9+	Trigonal	Grinding wheels for cast iron, brass, stone, glass. Abrasive coated paper and cloth. Refractories. Electric heating elements.
9. Boron carbide	Electric furnace from carbon plus B_2O_3	B_4C	2.3-2.6	9+	Rhombohedral Hexagonal	Sand blast nozzles. Lapping powders. Dies. Guides.
10. Diamond	Natural ore	C	3.51	10	Isometric tetrahedral	Abrasive wheels for grinding cemented carbides, steel, glass, vitreous tile, agate, petrified woods. Tools for truing grinding wheels.

major activity of the chemist. This is in the field of purification of public water supply and in the rapidly growing art of scientific treatment and disposal of sewage.

The aeration process of treating sewage is essentially the acceleration of a natural oxidation such as takes place in rivers and lakes where sewage is discharged without treatment. Nature's process, however, is accompanied by nuisance and water pollution that are obnoxious and dangerous to public health. The most effective modern procedure is to concentrate the sewage in large aeration tanks. Installed over air ducts or troughs in the bottom of these tanks are continuous rows of porous diffuser plates or tile made from ceramic bonded abrasive grains. These plates are commonly 12 inches square and 1 inch thick. Air is forced through the porous plates by compressors. The porous diffuser plates break up the air into fine bubbles. From these is absorbed oxygen to support the bacteria which attack the waste matter and render the sewage liquor harmless. The treatment for which nature requires days or weeks is thus accomplished in a few hours.

There is a fast-growing and nation-wide movement to stop all discharge of raw sewage into our rivers and harbors. Some 200 of the largest cities of the United States and Canada have sewage treatment plants of the type described, and over a million abrasive diffuser plates have already found use in these installations.

Following the same process of aeration, public water supplies are now treated for the removal of objectionable gas or dissolved solids. Only a few minutes' aeration is necessary as compared with several hours in the case of sewage.

A new use for porous plates is a supporting underdrain structure for sandbeds required in water filtration. Here the valuable property of uniform and controlled porosity plays an important part. These plates perform the dual function of receiving the water after it has been filtered by the sand and of distributing wash-water to the sand when periodic cleaning is required.

Miscellaneous Uses

In fractionating columns of chemical plants crude silicon carbide in lumps ½" to 2" in diameter is finding new uses as a packing material. It operates at high efficiency, particularly in that it seems to increase the sharpness of the separation of the products being treated, and its complete inertness towards chemical liquids and vapors makes it valuable where corrosive substances are being handled. Several theories have been advanced to account for its efficiency, the most generally accepted being that it is due to the porosity of the product and to the innumerable sharp points and edges of the silicon carbide which act as condensation points.

In the chemical industry there is also a demand for catalyst carriers consisting of ceramic bonded fused alumina grains, such as aggregates ranging in size from ⅛" to ½". The catalyst carrier aggregate is packed in towers, and the gas which is to be subjected

Table 2—Grinding Wheels

Type of Abrasive Wheel	Type of Bond	Kind of Abrasive	Purpose for which used
1. Snagging	Rubber Resinoid Vitrified	Fused Al_2O_3 SiC Corundum	Removing excess metal from castings, billets, welds; and all types of rough grinding where finish is not required.
2. Cylindrical grinding	Vitrified Resinoid Rubber Silicate Shellac	Fused Al_2O_3 SiC Corundum	Rough and finish grinding of cylindrical metallic and non-metallic materials to precision limits such as machine and engine parts, shafts, pins, rolls, etc.
3. Surface grinding	Resinoid Vitrified	Fused Al_2O_3 SiC Corundum	Rough and finish grinding of flat surfaces of metallic and non-metallic materials to precision limits such as machine and engine pieces, bearings, flat stock, plates, dies, etc.
4. Internal grinding	Resinoid Vitrified Metal	Fused Al_2O_3 SiC Diamond	Grinding internally cylindrical surfaces of metallic and non-metallic materials to precision limits such as bushings, bearings, etc.
5. Cut-off and Stone Cutting	Vitrified Resinoid Rubber Shellac Metal	Fused Al_2O_3 SiC Diamond	Parting operations (replacing saws) on metallic and non-metallic materials. Sawing of tile, granite, marble. Cutting of rods, steel, brass, carbon, molded plastics, etc.
6. Ball	Vitrified	Fused Al_2O_3 SiC	Rough and finish grinding of balls for ball bearings.
7. Pulp	Vitrified Natural	Fused Al_2O_3 SiC Silica	Grinding wood, cane stock, for paper pulp.
8. Glass	Vitrified Resinoid Metal Silicate Natural	Fused Al_2O_3 SiC Diamond Silica	Cutting and polishing glass.
9. Cutlery	Vitrified Resinoid Silicate Natural	Fused Al_2O_3 SiC Garnet Corundum Silica	Rough and finish grinding of knives, axes, saws, etc.
10. Die Sinking	Vitrified Metal	Fused Al_2O_3 SiC Diamond	Rough and finish grinding of dies, molds, etc.
11. Stones, Rubs, etc.	Vitrified Resinoid Rubber Silicate Natural	Fused Al_2O_3 SiC Garnet Corundum Silica	Hand abrading tools for grinding and polishing, such as whet stones, polishing blocks, rubs, household stones, etc.
12. Dental points	Vitrified Resinoid Metal	Fused Al_2O_3 SiC Diamond	For oral and laboratory use by dentists.

to reaction is passed through the towers under pressure.

Silicon carbide is widely used in lightning arresters on electrical transmission and distribution lines for the protection of high voltage circuits. In one form the resistor consists of a column of granular silicon carbide in a chamber of insulating material. In another form it comprises a column of flat discs made of silicon carbide grains bonded by a ceramic binder. Silicon carbide possesses a peculiar electrical property which makes it valuable for lightning arrester work, namely that, as the voltage across it is increased, its resistance rapidly drops. Very few materials possess this valuable property.

In another type of silicon carbide resistors, current is passed continuously to heat the resistor to incandescence. Such heating elements are produced in a wide range of sizes extending from room heaters for frosty mornings up to units liberating forty or fifty kilowatts each. These resistors have raised the temperature limit in commercial electric furnaces for large scale operation some 300 to 400° C. past the "Nichrome" range and have proved very useful in giving clean heat at these higher temperatures under controlled atmospheric conditions in both the metallurgical and ceramic industries. One of their incidental merits is that they can be secured for operation at standard voltages so that the furnace owner does not have to buy an expensive special transformer for his job.

Refractories

It is of interest to note that hard materials widely used for abrasives find extensive use also because of their refractory properties. Both silicon carbide and

Table 3—Coated Abrasives (Sandpaper)

Kind of Abrasive	Backing	Range of Grit Sizes	Form	Purpose for which used
1. Fused Al_2O_3 Aluminous Oxide	Paper Cloth Combination	20-400 24-320 20-80	Sheets Rolls Belts Discs Cones	Woodworking, Floor sanding, Furniture, Metal working, Automobile bodies, Finishing of leather.
2. Fused Al_2O_3 Aluminous Oxide	Vulcanized Fibre and Cloth	16-180	Discs	Sanding Discs on Portable Sanding Machines for Automobile bodies, and Metal Sanding.
3. SiC Silicon Carbide	Paper Cloth Combination	24-400 24-320 12-150	Sheets Rolls Belts Discs	Shoe and Leather, Glass, Asbestos.
4. SiC Silicon Carbide	Paper (Waterproof Bond)	60-600	Sheets	Wet Sanding of Lacquer and Synthetic Enamel on Automobile Bodies.
5. Garnet	Paper Cloth Combination	20-280 24-150 20-80	Sheets Rolls Belts Discs	Woodworking. Furniture.
6. Flint	Paper	4/0-3	Sheets	Sanding Wood and Paint Surfaces.
7. Emery	Sheets Cloth		3/0-3	Metal Finishing and Polishing.

aluminum oxide are very refractory and retain their strength and rigidity at very high temperature, and it may be assumed that the interatomic forces which are responsible for the extreme hardness of the material require thermal energy of high intensity to break them down so the crystal no longer retains its rigidity but becomes liquid. The melting point, or the freezing point, of a pure crystal phase may be regarded as the temperature below which the crystal forces become sufficiently strong to overcome the random movement of the atoms or molecules within the liquid. If these crystal forces are very strong, it naturally follows that even at very high temperatures they can overcome the random movement which takes place within the liquid.

Until recently the extremely refractory particles of silicon carbide, fused alumina and the like were always bonded with other more fusible material such as clay when made into refractory shapes. Within the past few years, however, the technique of casting molten oxides such as alumina has been perfected so that the refractoriness of the crystalline material can now be fully utilized. As originally produced, such castings were very susceptible to heat shock and hence the widest use of these refractories has thus far been in the glass industry where the evenly sustained high temperatures have obviated any trouble from this factor. Additional research has in considerable measure now overcome this defect so that it is believed that steady extension of the use of this type of refractory in other fields may be expected.

It was found that the admixture of small amounts of various ingredients had a marked effect upon resistance to heat shock as well as the chemical properties of the material and a considerable number of superior modified refractories of this type are now available. They vary in chemical character from the relatively acid mullite type through the more neutral alumina group (modified with chromite in some instances) to highly basic materials. Due partly to the solidity of the castings which offer a minimum surface to attack, and partly to the qualities of the refractory materials themselves, many of the cast products have unusual chemical stability and are capable of resisting for prolonged periods the corrosive action of iron slags and even of molten caustic itself.

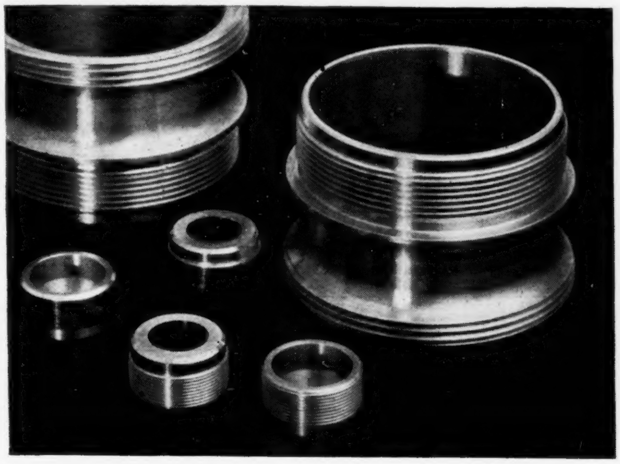
Among the most interesting of these cast products is perhaps beta alumina, of which the density and thermal conductivity are both materially lower than those of the alpha form and which has shown outstanding resistance to fused fluoride glasses. Another useful material is boro-alumina ($3Al_2O_3.B_2O_3$). This new crystalline substance has high refractoriness, high electrical resistivity and a coefficient of expansion low enough to indicate it as an excellent ingredient for spark plug bodies and the like.

Future Trends

A word should be said as to future trends in the abrasive field. The two standard abrasives, silicon carbide and crystalline aluminum oxide, are of sufficient hardness to grind almost every material commonly used in the arts, and as they are comparatively cheap and efficient there seems to be little likelihood of their being replaced by harder materials except for special applications. However, in certain lines of grinding there is a definite need and a definite quest for harder abrasive substances.

There is a far wider gap in the hardness scale between silicon carbide and the diamond than is com-

monly realized and an abrasive which would be cheaper than the diamond and which approached it in hardness would be welcomed. Boron carbide is the only product yet developed as a commercial abrasive which has a hardness between silicon carbide and the diamond.



In the airplane too, every moving part is ground for balance and accuracy. Group of ground threaded airplane parts ground with crystalline aluminum oxide wheel from the blank.

There is little question but that this material as developed by Ridgway is the hardest synthetic material yet produced in quantities. It is used to some extent as an abrasive, especially in lapping operations, but its most important uses are in the fields where wear-resisting properties rather than cutting ability are required, particularly as sandblast nozzles and dies.

Defining Hardness

The question of hardness has long been a somewhat controversial subject among those interested in abrasives, since it has been difficult to formulate any rigid definition of hardness or a method of measuring it which would give results consistent with other apparently equally well adapted methods. The difficulty has been that the various methods of measurement were concerned with the indirect effects of hardness rather than with the absolute property itself. The true hardness of a crystalline abrasive is primarily a function of the interatomic forces holding the atoms of the crystal together, so that it seems possible that an ultimate measure of hardness might be obtained by measuring the force required to distort the crystal lattice. Such distortion could be measured by X-ray diffraction methods.

The degree of perfection of the crystallization of an abrasive is another factor which appears from our researches to exert at least a minor influence upon its hardness or cutting ability. Hence methods of altering this factor may be among the things which will distinguish the abrasive of tomorrow from today's product.

In the quest for harder materials, some noteworthy research has already been carried out in dissolving various other carbides in fused boron carbide. When various carbides are fused with boron carbide and cooled they are crystallized from the boron carbide which acts as a solvent. The carbides of tungsten, tantalum, vanadium, zirconium and the like, dissolve readily in boron carbide and crystallize from the melt as separate crystals. In fusing silicon carbide in boron carbide, it is found that approximately 35 per cent. of silicon carbide can be added to boron carbide without destroying the continuity of the matrix.

The manufacture of industrial diamonds is now receiving the serious attention of several independent researchers and active work has been in progress which holds great promise of success. No major difficulties are apparent in producing small diamonds of the grade of diamond dust at prices not greatly out of line with the diamond dust now on the market. The cost will, in the course of time, be brought down so that wider use will follow. Then, when man has learned to duplicate this greatest natural abrasive successfully he will doubtless set himself to improving on it. In fact, efforts in this direction are even now being made. Such is the spirit of research which since the time of Acheson has animated the abrasive industry, and must continue to animate it if it is to hold up its head in the world of modern chemistry.

Petroleum Products and Lubricants

An extensive report was presented recently to the American Society for Testing Materials by the Society's Committee D-2 on Petroleum Products and Lubricants which included recommendations on four important proposed tests as follows: Carbon residue of petroleum products (Ramsbottom carbon residue); gum stability of gasoline, and tetraethyl lead in gasoline. The procedure covering the Doctor Test for Motor Fuels appearing in the preprint of the report was withdrawn. The carbon residue test was recommended because a comparison made on six oils using the Ramsbottom method and the A. S. T. M. Method D 189 indicated better reproducibility with the former. This test is intended to throw some light on the relative carbon formation propensities of oils but the results should be considered with other tests and the use for which the oil is intended.

Based on extended research work, which was described in a report of the Section on Gum of Technical Committee A on Gasoline, appended to the D-2 report a proposed method of test for gum stability of gasoline was accepted as a new A. S. T. M. tentative standard. While storage tests have some drawbacks, they are broadly significant with respect to gum formation. However, of the two tests available the bomb test is more generally used and it was recommended as the tentative method. Methods for determining tetraethyl lead in gasoline and volatile distillates were also recommended. In this method the tetraethyl lead is converted to lead chloride by refluxing with hydrochloric acid, and the lead determined volumetrically by titration with ammonium molybdate or gravimetrically as the chromate or sulfate.

Appended to the report as information were proposed specifications for aviation gasoline. The committee hopes in the near future to reconcile differences and have the requirements published by the Society as tentative. In the methods five grades are provided, varying chiefly as to octane number. The grades are designated by their respective A. S. T. M. octane number as follows: Grades 73, 80, 87, 90 and 95.

Rubber isn't plain rubber any more—always it is now a rubber compound and by more scientific compounding, to say nothing of direct modification of natural rubber's properties by chemicals, uses have been widely extended. Besides we now have latex, the so-called synthetic rubbers, and a host of new rubber-like plastic materials. The three greatest chemical consulting organizations in New England have joined forces in this article to define all these new rubber-like materials and to describe typical applications of each in new uses developed better to meet old needs or wants.

New Goods for

IT bounces; it stretches and snaps back. And any schoolboy will add to these distinctive properties of rubber its great versatility of form: "hard as a fountain-pen barrel or soft as the art teacher's eraser."

Because of these characteristics, wherever resiliency and elasticity—bounce and stretch—are needed, rubber is the ideal industrial material. That is, it was till quite recently.

Of late new rubber-like materials that are not chemically rubber at all, have been made which can do some things for mankind even better than rubber. At the same time, rubber itself has been improved by more intelligent chemical treatment.

We use more rubber than all the rest of the world, and most of the hundred odd million pounds we import goes rolling about the land under our trucks and buses and pleasure cars as tires. Indeed, more Americans can thus apply a personal yardstick to rubber progress than to any other great chemical development making for better and cheaper goods. For we have all observed that year after year tires are lower in price and longer in mileage. That economic miracle can be measured. Twenty years ago 7,565,446 motor vehicles were registered and 32,835,509 casings were sold, or just about four and a third per car, or less than a year's tire life. This year it is estimated that about 27 million cars will be registered and about 46 million tires sold, or 1.78 tires per car, which for four wheels gives 2.3 years of tire life. Dr. William Geer counted license plates and miles and tire costs and then calculated in an article in CHEMICAL INDUSTRIES last year that this longer tire life saved the American motorist $491,109,-409. Balloon tires, better cords, good roads, these have all helped; but most of that saving must be credited straight to better rubber compounding.

For always we use, not rubber, but a rubber compound. It may be almost 90 per cent. rubber as in so-called "pure gum" tubing; but it may be less than 30 per cent. in an electricity-proof rubber watting. More chemical knowledge of compounding materials and greater skill in actual compounding, have improved all lines of rubber goods. So the rubber industry has at once staved off growing competition from rubber substitutes and brought to all industries new and improved types of rubber as were quite unknown ten years ago.

The natives of the South American jungles who discovered the use of rubber collected the sap of the trees and evaporated it to sticky gum. Till quite recently we have followed in principle their primitive operation, and for the same reason. The thin sap ferments and loses its rubber-like properties. Now we know how boiling cleans and preserves the latex. Within the decade of the depression we have found chemical means of preserving the sap and what is literally liquid rubber has opened up many new possibilities. It can be sprayed, dipped, and spread. Small wonder that in ten years our use of latex has jumped from 8 million to over 50 million pounds. New applications and new products are developed almost daily. Let us consider some of those which suggest money-making ideas either in the manufacture of new goods or in money-saving substitutions of older materials. To be business-like let us take them up in order of rubber products, latex products, and rubber-like plastics.

Farmers are finding new uses for rubber. Most of the 26,000,000 farm vehicles and wheeled implements lack rubber tires, and developing special types to meet various conditions of use on the farm is a major portion of the big tire industry research. This and many other new uses for rubber on the farm, such as tubing and orifices for milking machines, rubber horseshoes, pads, boots for cattle and sheep, are opening up rubber's biggest, newest market. Rubber sleeves over the steel tines of potato diggers mean markedly less damage to the tubers. A slotted rubber pad for tying trees to supporting stakes, and use of rubber in fruit and egg grading machines, are other interesting new agricultural applications.

Rubber molds are used by the Superior Cement Company for precasting concrete floor slabs, floor or wall tile. The concrete may be vari-colored and is placed by vibration. The process is open to license, and a smart fellow might think up other cold molding materials.

A new porous form of rubber sold as "Rubatex" has wide applications for heat and sound insulation, insulation and flotation. The material is lighter than cork or balata wood and will not sop up moisture. Recent Government tests in life jackets and belts suggest a likely cork substitute. For rock wool in building insulation it is lighter and drier, which are advantages that suggest other uses. Early objections to odor from

hydrogen sulfide gas retained in the cells are said to have been overcome, and Rubatex Products, Inc., have already licensed three firms to manufacture, of which only one, Virginia Rubatex Co., is in actual production.

Rubber in the joints of concrete roads does not, like asphalt, flow out in summer and in winter become so hard that it prevents "giving" of the blocks. First costs of rubber jointing material are high, but upkeep is negligible compared with the twice yearly replacement of asphalt and damage from cracking of concrete blocks. Parabond Corp. of America has perfected a joint material which is trowelled in like putty and in fair weather sets a few hours after placement. Material in place for a number of years on Massachusetts highways shows no deterioration or need of replacement. Some surface cracking due to oxidation serves as a protective coating for the material underneath.

Flexible, waterproof, wrapping material known as "Parafilm" has been developed by Marathon Paper Mills. It is a sheeted paraffin-rubber or paraffine rubber-like material. Although not transparent, its remarkable moistureproofness, ease of sealing at low heat and pressure, availability in a variety of colors, and ability to stretch without elastic regain of its original dimensions, have led to extensive use in wrapping potted plants, wreaths, flower stems, certain foods, in the manufacture of artificial flowers, and as splicing tape in the paper industry.

"Plioweld" is rubber permanently coated over metal by a special bonding agent with vulcanization of the rubber after application. Developed by Goodyear, it is useful as a liner for vats, vessels, and drums, and as a protective coating for equipment exposed to corrosive fumes. Recently installed at Akron, a 90-ton heater makes it possible to apply Plioweld coating to large parts.

Drilling deep oil wells requires a rubber hose which will withstand very high pressures; and one that stands 10,000 pounds per square inch, in diameters up to 3 inches, has recently been perfected. The fluid tightness imparted to the hose by rubber and frictioned tape is strengthened by the multiple spiral windings in both directions.

Hard rubber can now be used as a bonding agent for the toughest kind of grinding wheel, and also for the thinnest kind—as thin as 0.006 inches.

One of the first important applications of latex was in rubber thread, the basis of "Lastex" which has found such wide-spread use in foundation garments, hosiery, and underwear tops, garters, bathing suits, abdominal supports, and upholstery fabrics. United States Rubber produces Lastex; and a modification, "Contralastic," consisting of wrapped layers of rubber instead of a single thread, is manufactured by Firestone.

Nowadays the most rapidly expanding use of latex is in the sponge form or "latex foam" for cushion material in seats of automobiles, buses, trucks, airplanes, chairs for home, office, and theater, and for mattresses. In automobile seats latex foam is not only a shock absorber to give a "floating" ride, but a space saver over conventional cushion materials. Hudson and Nash cars have rubber seats, and the Chrysler line have "foam rubber" bumpers on the backs of the front seats. Extensive replacement of such materials as hair, feathers, and cotton is foreseen.

Articles of latex foam are produced by whipping air into liquid latex, pouring into shaped molds, and vulcanizing. The latex cells are interconnecting so that air within is not confined, and the superior strength and other properties of sponge rubber make it an exceedingly interesting material. Originally perfected by Dunlop in England, American licenses have been granted to all our larger rubber manufacturers.

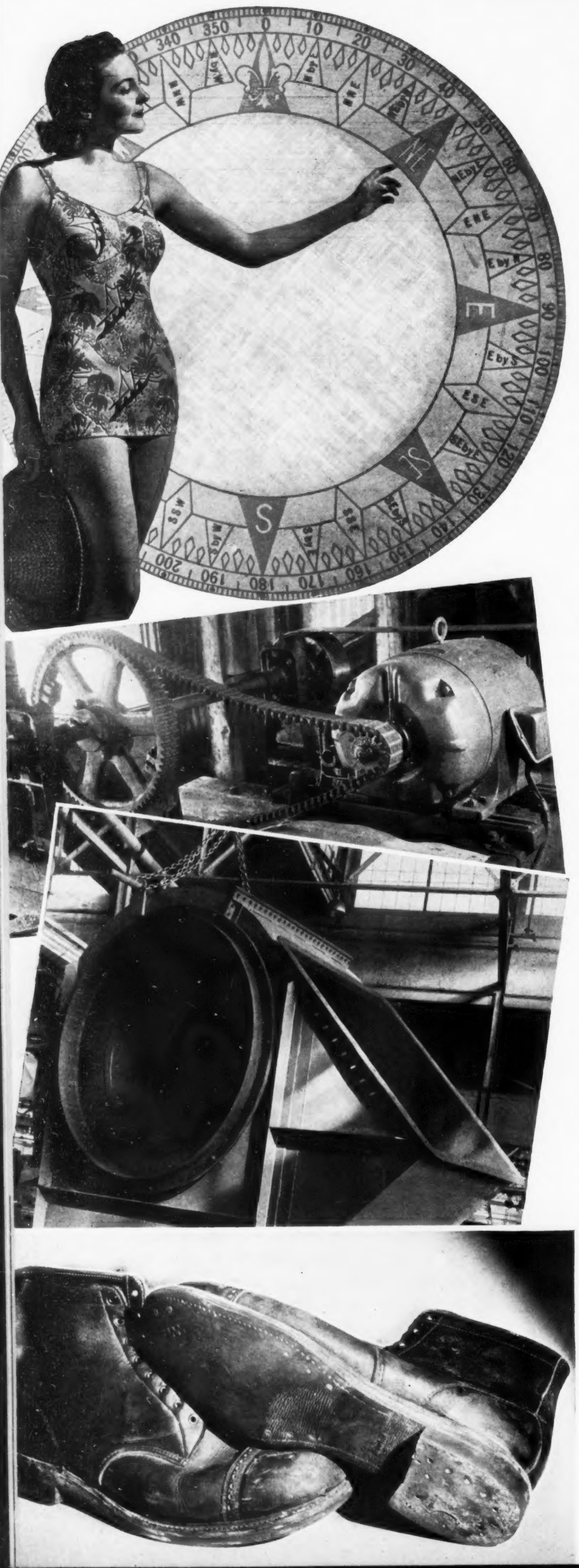
A recently patented use of latex is an addition to mixes for ceramic articles such as china, porcelain, tile, or refractories to hold their shape before and during firing. Economy is effected, since large or thin-walled pieces are easily broken before firing and after firing there have always been many discards due to imperfections. Latex in refractory mixes permits reduction of clay content, thus improving the quality of the refractory without sacrificing shaping characteristics of the mix before firing and reducing the number of discards.

The Kaysam process of casting rubber latex, developed in England and sponsored by Kaysam Corporation in this country, is being used for soles, metal inserted heels, cloth inserted boots, toys, and other purposes where toughness is needed for hard wear. The principle consists in casting articles directly from latex, dewatering, and then vulcanizing, thus obtaining maximum strength, for it is well known that when broken down in the milling machine rubber loses some of its initial strength. Compared with old style masticating,

Old Industries

RUBBER & ITS SUBSTITUTES

A Collaboration By
Gustavus Esselen, Inc.,
Arthur D. Little, Inc., and
Skinner & Sherman, Inc.



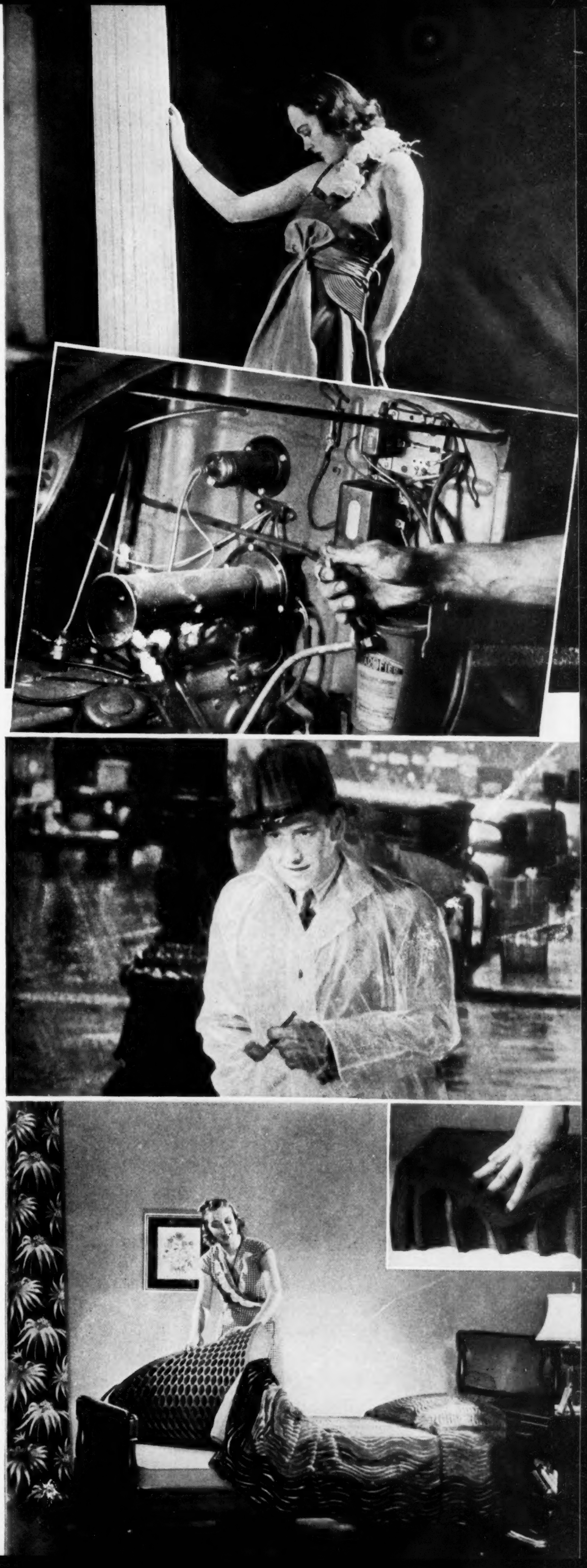
The wide diversification of the newer, striking uses are aptly illustrated—From top to bottom: Bathing suits made of "Lastex" Yarn (courtesy, Adamson Bros. Co., Inc.) "Lastex" is a U. S. Rubber development; "Neoprene" (Du Pont) magnet wire in a Century motor over a dye vat; "Plioweld"-rubber directly coated to metal in a large scale blower installation, courtesy, The Goodyear Tire & Rubber Company; "Neoprene" soled shoes that resist the deteriorating effect of oils and greases.

direct casting involves less expensive equipment, cheaper maintenance, smaller floor space, and savings in occasional or small production. At the time of casting the rubber batch must be high in solids—preferably about 60 per cent., but thin enough to pour. All the usual colors, softeners, vulcanizing agents, and anti-oxidants may be employed. If ozone or oil resistance is desired, Neoprene latex may be substituted for rubber latex.

Simplex Wire and Cable Company has recently developed "Anhydrex," a special rubber insulating compound for sheathing underground and underwater cables. Lead and gutta percha sheathing have certain drawbacks for such uses, and rubber itself will absorb water under constant exposure. This new product is made from rubber latex, whose water soluble and water absorbing constituents have been removed by a special process, followed by mechanical refinement of the remaining materials. Vulcanization then gives a product which is extremely resistant to water and which might well be used for other things than a cable coating.

Rubber coating to metal was long retarded by lack of rapid, economical, convenient methods of application to irregular shapes. The Anode process, developed by B. F. Goodrich overcomes these difficulties. The articles to be coated are immersed in latex to which the necessary compounding ingredients have been added, and in one continuous rapid operation are given a coating of any thickness. This coating is dried and cured to desired consistency, and the resulting bond is stronger than the rubber itself. This coating is tough, strong, and cannot easily be torn or cut. It has good acid resistance and unusually high wear and abrasion resistance. Screens so covered with it handle from four to six times as much abrasive material as bare screens. It naturally suggests itself as covering material for plating racks, dipping baskets, floats, stirrers, chemical laboratory apparatus and equipment, and chutes. The anode process is also an excellent method of applying latex for heat, sound, and vibration insulation, or for improving the feel of metal handles and toys.

One of the old problems of the fast-growing frozen meat business is being solved by latex bags. Expanded, the meat inserted, deflated and sealed, these "Cryovac" containers not only become a perfect permanent wrapping for odd-shaped beef shoulders, lamb quarters, and especially for poultry, but they also prevent "burning" during the freezing process. Thus there are material savings and improvement in quality and appearance which promise much for these new rubber coverings which have been successfully developed by Dewey & Almy Chemical Co.



"Parafilm"—a product of Marathon Paper Mills is used as a wrapping for the corsage of this lovely lady; "Resistoflex"—a product of the Resistoflex Corporation finds special application in your automobile because of its resistance to gasoline, oils, etc.; feather-light raincoats of Koroseal (B. F. Goodrich) can be folded to a few inches square; mattresses and cushions of Goodyear's "Airfoam" supply added ease and comfort. Cannot some of these new materials improve your product?

"Vultex" represents another new method of employing rubber latex. This vulcanizing before application does not apparently change the colloidal condition of the latex and the material has novel applications in the manufacture of dipped goods, spreading on fabrics, for rubber films, surgical and dental goods, and the like. It can be colored with any alkali-resistant dye as well as with various filling materials. Big advantages are elimination of the use of organic solvents and the necessity of later vulcanization which both tend to harm fabrics which have been coated or impregnated with ordinary latex.

Thick electrical gloves, beach shoes, seamless overshoes, fabric lined gloves, and tobacco pouches are all being made of latex. Du Pont is producing "Texon," a latex impregnated fiber sheet for midsoles and inner soles of shoes. Wire, particularly thin-walled insulating wire, is being extruded through latex. Latex mixtures are being used in important developments in the paper industry and for the production of leather substitutes and brake linings. The smooth and uniform gel-formation obtained by heat treatment of latex permits its use in the molding field.

In the past decade, many new rubber-like synthetic plastics have come on the market, and many experts believe that the most important plastic developments of the next few years will be in those with rubber-like properties. Such plastics are often termed rubber substitutes or synthetic rubber. But all are more costly than rubber. They are of different chemical constitution and possess properties superior in some respects to rubber so that term is not very apt. Their superiority to rubber in certain respects opens new fields. In old uses they can replace rubber only when they show savings because of longer life. As output increases with a consequent reduction in costs, these new rubber-like plastics will become more and more attractive in many industrial uses. They all bear close watching for these potentialities.

These rubber-like plastics fall into the following different classes according to the materials out of which they are produced: vinyl derivatives, chloroprene, compounds of butadiene, polysulfide compounds, chemical derivatives and altered forms of rubber itself.

Vinyl chloride is a chemical derivative of hydrocarbon gases. It is the basis of an important type of synthetic resin, and when highly plasticized and polymerized the product possesses rubber-like properties. Carbide and Carbon Chemicals Corporation produces vinyl chloride and, besides manufacturing synthetic resins from it, sell it to others to be made into rubber-like plas-

tics. At least four companies are making this type or closely related types of material. The B. F. Goodrich Rubber Company manufactures a line of vinyl chloride plastics under the names of "Koroseal," "Korogel," and "Korolac," ranging in consistency from bone-like hardness, to a jelly, to a viscous liquid. The solid "Koroseal" is superior to rubber in resistance to prolonged flexing, to strong corrosives, water, oxidation, and also in the absence of swelling or disintegration from certain oils and solvents. Among its particular applications are gaskets or sealing members working in oils; transformer gaskets; laboratory tubing for chlorine, ozone, sulfur chloride, and other chemicals; flexible sleeve service in grease and alternately carrying solutions of acids or chemicals; packing for hydraulic valves. "Korogel," the jelly form, is excellent material for flexible molds for casting plaster of Paris, Keene's and Portland cements, and synthetic stone; better than glue-gelatine for this purpose. It can be melted and used over again, and the molds neither dry out nor freeze. "Korolac," the solution of the material, is used by electroplaters for treating plating racks.

General Electric's New Materials

The "Flamenol" type of plasticized vinyl chloride products, manufactured by General Electric is flame-resisting and withstands the action of oils, alkalies, acids, and moisture. Its high dielectric strength and excellent finish make it particularly suitable for insulating and finishing wires and cables. A single layer provides effective and long-time protection. Unless mechanical abuse is extremely severe cables need no protective braid, lead, or armor. It comes in a variety of colors which facilitates tracing and identification of circuits, and "Flamenol" coating is particularly adapted to machine-tool wiring, battery, coil, and certain motor leads, and other uses which must withstand extraordinary conditions such as bridge, aerial, duct, or underground installations.

"Resistoflex," made from polyvinyl alcohol by the Resistoflex Corporation, is so flexible that it can be tied in knots. Developed abroad, it was created specifically for resistance to oils, gasoline, and organic solvents, and it is claimed to be the only synthetic rubber-like product completely insoluble in these materials. It is offered chiefly as tubing, for the fuel and brake lines and lubrication systems in automotive equipment, for conveying solvents and vegetable oils, for hydraulic lines, and in fuel and oil handling equipment. It may be used in a temperature range from minus 55° F to plus 275° F, but is not highly resistant to steam or water; hence, in such contacts it must be protected by a sheathing.

The chloroprene type is represented by "Neoprene." This material is made from acetylene and hydrochloric acid. The Du Pont Company does not manufacture any products from it, but sells it in sheets similar to smoked rubber sheets, and emulsified in water to form Neoprene Latex. Neoprene swells much less than rubber in animal, vegetable, and mineral oils. Sunlight, heat, and most chemicals affect it less than they do rubber. It has about the same order of tensile strength, but gases diffuse through it much more slowly. It is compounded, milled, and vulcanized in the same equipment as rubber, but zinc oxide instead of sulfur is used as the vulcanizing agent. These properties have led to its widespread adoption in air, gasoline, fuel oil and fuel gas hose, conveyor belting, sheet packing and gasket material, printers' and textile rolls, electric cables, ignition wires, gasoline tank seals, gloves, protective clothing, footwear, leather cements, motor mountings, and vibration dampeners, diaphragms, molded goods, and a thousand and one other articles. Originally selling for $1.05 per pound, economies in large-scale production have permitted reductions to 65 cents per pound.

Gasoline pump hose made of "Thiokol" has many distinct advantages over hose made af natural rubber.

Striving for chemical self-sufficiency Germany has made mighty efforts to develop rubber substitutes. These have culminated in "Buna" rubber. Numerous types are produced in Germany for various uses. The basic material is butadiene, derived by synthesis from acetylene. The best known type of Buna in this country is called Buna N, and under the name Perbunan, the imported product is now being tried out on the American market. Like other synthetic rubber-like materials, it is more expensive than rubber, but superior to it in some respects. It is reported to have better resistance to oil and gasoline, heat and sunlight, and to possess good abrasive qualities.

"Thiokol" is a rubber-like product made from sodium polysulfide and ethylene dichloride by the Dow Chemical Co., for the Thiokol Corporation. It comes in sheets, granules and molding powders and has been welcomed in much the same fields as Neoprene; namely, the automotive and oil industries, in refrigerating and air conditioning, in printing and for many other applications. Molded products of "Thiokol" are oil-proof, flexible, non-arcing, durable, resilient, resistant to common solvents and the dilute acids. It can be formed and finished in one operation. It is a head-on competitor of leather, felt, cork, soft metals, and rubber. Not only the rubber companies, but molders of plastics also can use their regular equipment in turning out Thiokol products.

"Vistanex" is a rubbery-like stuff made from petroleum gases by Standard Oil Development Co., and sold by Advance Solvents and Chemical Corp. It is offered in four grades ranging from a soft, viscous, sticky product, to a tough, dry, elastic material. Unlike rubber it does not combine readily with sulfur, nor does it oxidize easily. Substituted in compounding for substantial amounts of rubber, it gives better aging, lower moisture absorption, improved electrical characteristics, decreased swelling in many solvents and in most oils, greatly improved resistance to strong acids, to oxygen, and to alkalies. Suggested uses are in superaging compounds, for acid resistant articles, in electrical insulation, fabric proofing, laminating materials, and in emulsion form for adhesive purposes such as tin pastes, paper backing of metal foils, facing bottle cap liners, as heat sealing adhesives, and as leather dressings or finishes.

Chemical Derivatives of Rubber

Chemical progress has not left rubber itself untouched, and chemical derivatives of rubber have been developed which possess properties not found in the natural gum. Perhaps the most familiar examples are the transparent umbrellas and raincoats made of "Pliofilm," a rubber hydrochloride product manufactured by Goodyear. It is made in a variety of colors and is tough and strong. Many uses suggest themselves for it, such as bathroom curtains, garment bags, rugs, and transparent wrapping materials.

Other rubber hydrochlorides are the Marbons, produced by the Marbon Corporation, which are available with widely different properties, from amorphous to crystalline states, readily or difficultly soluble in the common solvents, and from a soft material handling much like rubber to a tough material worked with considerable difficulty. It resists oils, moisture, acids and alkalies and may be molded and set by heat, but it may also be vulcanized to a product having many of the properties of rubber. The material is being used for coating paper, particularly for packaging food products, as a basis for various adhesives, and as a substitute for rubber where its special properties offer an advantage.

Rubber lined, brick sheathed acid tanks.

Goodyear has developed also two forms of so-called modified rubber, "Pliolite" and "Plioform" in which the arrangement of the rubber molecule has been altered, thus imparting new properties to the material. They are made from pure white crepe rubber dissolved, chemically reacted on, precipitated in fine, granular form, thoroughly washed and dried, and then milled and compounded into "Plioform" for molding, or "Pliolite" resins for surface coatings. Plioform is a true thermoplastic (on cooling it regains its original hardness) and is available in a number of grades of different molding temperatures. Its tensile strength is 4,000 to 5,000 pounds per square inch, compressive strength 8,500 to 11,000 pounds, and transverse strength 7,000 to 8,000 pounds. Water absorption is extremely low, resistance to strong alkalies and to concentrated acids (except nitric and sulfuric) is high. It is insoluble in alcohol and acetone. Electrical properties are good, and in hardness it resembles hard rubber. But "Plioform" contains no sulfur. It can be colored any desired non-transparent shade, and translucent and pearl effects are also obtained. Thick sections are quite rigid, but thin sections are fairly pliable. It works readily in the mold and scraps may be re-used.

Uses for "Tornesit"

Another type of chemical derivative is chlorinated rubber, manufactured by Hercules Powder Company under the trade name "Tornesit." Its principal use is in surface coatings and its story belongs in that chapter; but it is also used in the formulation of fast drying and chemically resistant printing inks for soap wrappers and boxes; for adhesives requiring high moisture, fungus, and chemical resistance; on cloth, wood, metal, paper, cellophane, leather, cork, and linoleum; and in plastic molding compositions. Masking and cellophane tapes using "Tornesit" have been successful. It can be made into porous blocks or hard sheets for heat insulating purposes up to 100° C. An advantage in sound or heat insulation is its low moisture absorption. The relatively high price of Tornesit compared with other adhesives, however, limits its application to uses where its special properties warrant the added cost.

An interesting chemical derivative developed by the B. F. Goodrich Company is "Thermoprene," a molding material not sold as such, but only in the form of cements known as "Vulcalock." These are translucent,

amber liquids of light engine oil consistency, with remarkable bonding strength, ranging from 10 to 500 pounds per square inch, depending on method of application and materials joined. They resist cracking by bending, shock, or variations in temperature, and are superior to rubber in chemical resistance. Their limitations are inflammability, some degree of toxicity, softening under temperatures above 150° F, and sensitivity to solvents and to continued exposure to sunlight.

Uses for Vulcalock

Vulcalock has been particularly useful in bonding rubber to metal, and a few of its successful applications opens our eyes to the new uses of other new rubber cements: bonding materials to metals; applying Bakelite to surfaces other than rubber; band saws—adhesive between rubber cover and steel pulley; bottle seals—bonding cork and foil to bottle seals; brass—bonding metal and flux powder in the manufacture of coated arc welding rods; brushes—bonding hair or bristles to wood or metal; bonding rubber to concrete, etc.; cable—adhesive between wire and covering; bonding leather, etc., to metal; composition floor covering—bonding laminations; bonding rubber to glass and painted surfaces; rubber to molded caps for medicine droppers; adhesive between rubber and glass in manufacture of safety glass; grinding wheels—bonding abrasives to metals; sponge rubber to metal; adhesive between metal sheets, pulp products, etc.; adhesive between rubber and aluminum in cartridge tank covers; cloth to metal in spectacle cases; paper products, bonding foil, cellulose, scrim, etc., to paper in manufacture of paper bags; pens and pencils—rubber to pyralin in fountain pens; rayon—rubber to metal; adhesive for slip sleeves on rolls; rubber stamps—bonding rubber to various materials; sanding machines—bonding rubber to metal drums and cylinders; shipbuilding—rubber to metal in hatch covers; bonding celluloid to wood; adhesive for rubber to steel, bladders, golf-club head to shaft; rubber to metal in manufacture of rolls; bonding rubber lining in sand blast reclaim pipes; adhesive for insulation on wires; storage batteries—bonding gaskets to hard rubber; bonding metallic foils to textiles; lacquers and finishes to metals; truss pads—sponge rubber to metal; weatherstrip—adhesive between sheet aluminum and bronze screen cloth.

"Rubbone," a new insulating material developed in England on behalf of the Rubber Growers' Association, is essentially rubber in the form of a viscous gum. On heating in air it takes on additional oxygen, and becomes a hard, brittle resin with a complete loss of rubber-like properties. The electrical properties of Rubbone when mixed with drying oils and baked to produce a flexible, solvent-resistant film, indicate that it may compete successfully with other insulating materials. Black baking varnish, impregnation of asbestos to improve its mechanical strength and dielectric properties are suggested as promising applications of this radically new form of rubber.

Possibilities for Alert Manufacturers

Even so brief a sketch of the new uses of rubber and its substitutes indicates that the alert manufacturer in any line will find unexpected materials awaiting his use in this group of materials. Our ideas of what rubber is and can do are pretty apt to be out-dated, and the chemist is quite apt to have a new answer to our inquiries as to what we require and what we can expect of the material.

Melamine Molding Plastics

A triamino triazine, melamine forms through its three reactive groups a large number of readily-prepared condensation products with formaldehyde and polybasic alcohols (e.g., glycerine, cane sugar, mannitol). From melamine, formaldehyde and glycerine can be prepared both molding powders and cast resin materials. *British Plastics Magazine*, June, '39, p. 27, gives methods by which such plastics are manufactured. Melamine combines directly with 30% formaldehyde in water to yield a resinous precipitate. The latter is dehydrated in vacuo, and the mass incorporated with glycerine and wood flour on hot rollers. The powder finally obtained can be molded at 145 deg. C. for three minutes. Cast resin is made by distilling the condensate with the glycerine until the batch temperature rises to 92 deg. C. After drying thoroughly in vacuo for 2-3 hours, the glass-like mass is poured into molds and hardened for 20 hours at 110 deg. C. The casting is described as a transparent, clear article.

Manufacture of Copper Acetoarsenite

Relatively simple is a recent improvement in the preparation of the fungicidal copper acetoarsenite salt, made by Chem. Fabrik V. Devrient A. G. of Hamburg, Germany. An aqueous mixture of copper and ammonium acetates is treated with powdered arsenious oxide, the reaction being complete in about 2 hours at 95 deg. C. It is reported that the copper acetoarsenite is obtained in practically quantitative yield as a precipitate, and that all of the ammonia remaining in the residual liquor can be recovered by adding sufficient fresh acetic acid. Details of the method are given by English Patent 505,465, abstracted in the *Chemical Trade Journal*, July 14, '39, p. 22.

Black Molybdenum Electroplates

Du Pont Co. has perfected an electrodeposition method producing lustrous black deposits from a solution containing essentially ammonium molybdate, nickel sulfate and boric acid. New finish is claimed to be especially suitable for art objects, fine hardware, business machines, etc., and is considered superior to other black-plating processes.

Purification of Naphthalene

Crude naphthalene can be purified efficiently, according to a new method described in English Patent 505,742, granted to Rütgerswerke A. G. of Berlin, Germany. The molten crude product is thoroughly aerated in an autoclave of special design, under 2-3 atms. pressure at about 270 deg. C., for several hours. Progress of the purification is measured by taking melting points on samples withdrawn from the batch. A naphthalene of high purity is recovered (80-85% yield reported on pilot plant trials) by fractional distillation of the contents of the autoclave. (*Chemical Trade Journal*, June 23, '39, p. 580.)

The Pulse of Opinion —

B. G. Zimmerman

General Aniline Works

Should Chemists Be Licensed?—All young chemists who have graduated or are expecting to graduate from approved colleges or universities should not only ask themselves this question but they should also study the question before answering it. State licensing is a protection for the chemists only when carried out by the proper authorities and should not be placed in the hands of so-called political men who are unable to conceive what the word chemist means. We must be careful in selecting the Licensure Committee and the committee must be careful in their qualifications for license. Perhaps it would be better to have two qualification requirements, one for college graduates with a B.A. or M.A. degree and the other for Doctorates in chemistry or Chemical Engineering. Certainly we cannot expect a college graduate with a B.A. or M.A. degree to pass the same requirements as a Doctorate in Chemistry or Chemical Engineering.

The idea of licensing only professional or consulting chemists who hold themselves out as such to the public is leaving the job unfinished, and is not going to help the rest of the group who may be classified as chemists. It is better to do the job right the first time instead of playing around with it. It is probably better to postpone the idea of licensing chemists until we are able to do the job right and include all of our fellow chemists.

A. W. Davison

Dept. Chemical Engineering, Rensselaer Polytechnic Inst.

I am personally opposed to the enactment of legislation requiring the licensing of chemists. I do not believe that any useful purpose will be served, neither do I believe that the general welfare of the public would be promoted.

John M. Weiss

Weiss & Downs

The licensing of chemists presents complex problems and it appears very doubtful if any substantial good can be accomplished by an act applying to chemists in general. The great majority are in private employment where their competence is carefully watched by the employer. If they are unsatisfactory, they soon lose their job. Certainly the public has no interest in this relationship and hence no license is required.

The public is more interested in that rather small group of chemists engaged in general work, either as consultants or as analysts. The true consultants are for the most part chemical engineers rather than chemists and are included under the general engineering license laws which exist in a majority of the states, which appear to meet all present needs.

There seems to be some justification for the licensing of "public analysts" with a sub-group especially licensed to conduct such chemical tests as are required by the medical profession. This last group is the one which has given rise to considerable discussion due to the incompetence of some (fortunately very few) of the practitioners.

It seems illogical to impose licensing on over 20,000 chemists to reach abuses which exist in a very minute fraction of the total profession. My conclusion is that public analysts might well be licensed but the remainder of the chemical profession is adequately covered under existing laws.

Frank J. Messmann, Jr.

The Wm. S. Merrell Co.

The chemist occupies a professional position apart from that of architects, lawyers, and doctors. He is employed, in general, not by the lay public but by an informed employer. This difference eliminates one of the principal reasons for licensing, the protection of the uninformed public from the services of the "quack."

Should Chemists Be Licensed?

Another purpose of licensing is the setting of minimum standards of professional education. For chemists, this function of licensing will be adequately taken care of by the system of accrediting scientific schools, without recourse to licensing.

Licensing is undesirable because many employers will tend to accept a man on the basis of his license alone. Obviously this would enable an unethical chemist to obtain employment in a highly specialized field in which he is not well qualified, thus reflecting discredit on the entire profession.

R. A. Duncan

Chemical Division,
The Procter & Gamble Co.

The proposed plan of licensing chemists arouses in me a certain elemental resistance which is, I think, the instinctive reaction of those who have been relatively free from bureaucratic regulation and now see themselves threatened with it. After the first surge of emotion has passed, and the situation is analyzed, it seems rather obvious that in a professional way chemists will gain by any system of registration which keeps out the fourflusher and interloper.

E. L. Luáces

Consulting Chemical Engineer,
New York, N. Y.

If the health and law departments of your village, town or city are headed by persons other than a physician and a lawyer, then you are living in an exceptional community. Physicians and lawyers—and those whom they serve—have for years been protected by licensing requirements. These requirements have not been set up as substitutes for sound academic training, but are complementary and an indication of experience necessary for practice and of moral responsibility. Today, the engineer is likewise protected in 41 of our States and 4 United States possessions. No such protection exists for the chemist—and the public has no guide of his competence. The need of governmental control over those who direct or supervise clinical laboratories and the manufacture of drugs and pharmaceuticals appears all too obvious to discuss at length.

Licensing would help in establishing chemistry as a profession. I am not among those who have ever questioned the professional status of the chemist. On the other hand I do not believe that membership in the C.I.O. should be a prerequisite to the obtainment of a job as a chemist in an industrial plant. Recently such requirements have been set up in certain places. Curiously, the chemical engineers in those places were not included. Why? Because they were recognized professional men! And why were they so recognized? Because the State required that they be licensed!

It seems to me that hard, cold, common sense should show the need of proper control of the practice of chemistry, not only for the protection of the public, but for the protection of the chemist as well.

George Barsky

Barsky & Strauss,
New York, N. Y.

Licensing professional workers is an old story. It protects the public from fakers, and it gives, at least in the eyes of the professionals themselves, some feeling of approval by the community. But to the chemist who is an employee, it means practically nothing. The only case where licensing would have any restricting effects on his activities would be in the case of a consultant. There is no question that the state should license those with whom its citizens come into direct contact.

The discussions now going on exhibit the signs of a tempest in a beaker. Some chemists have the idea that licensing will be a cure for all difficulties. Others, who are interested in professional societies, really would like to see membership in such societies as the public stamp of approval, rather than licensing, which might result in loss of members.

Charles E. Mullin

Consulting Chemist,
Huntingdon, Pa.

For many years I have been fully sold that licensing is desirable for all chemists and believe that chemists realize this and should draw up their own bill for presentation to the various legislative bodies.

At the present time, almost every trade and profession is licensed in some way. In Pennsylvania the undertakers have drawn up a bill so that the whole profession is under their control and no one can practice the business without a license issued under a board of examiners which limits the number of active undertaking establishments in the state.

W. O. Brewer

Pharmaceutical Division,
Calco Chemical Co.

In the past, state licensing of chemists has not seemed to me advantageous either from the point of view of chemist or industry. However, the demands for it by local and national Health Departments are certain sooner or later to bring about such legislation. For that reason chemists, as a group, should take an active part in promoting proposals which will insure a maximum protection of their interest. Such a course would accrue more to their advantage than one of obstruction.

Jerome Alexander

Consulting Chemist,
New York, N. Y.

While licensing will help protect both the profession and the public from frauds and quacks, the public and

the profession as well must clearly understand that no license is *prima facie* evidence of capability to do any particular job, even though it might give him the legal right to attempt it. For example, a duly licensed medical practitioner though legally entitled to perform all kinds of surgical operations and to treat all kinds of diseases, must be honest enough with himself and his patients to call for special experience where needed. What licensed engineer would attempt to practice civil, mechanical, electrical, naval, refrigerating, and chemical engineering, to say nothing of land surveying? And what chemist, even if licensed, could handle everything in organic, biological, analytical, and technological chemistry, each with its numerous sub-branches, and with physical and colloid chemistry to boot. One recalls the "Elephant" song in "Wang":

"The moral is to know your biz,
And when pie is passed by Fate,
Do not bite off a larger piece
Than you can masticate."

The public must be informed that a license is the minimum, like the 3% cream limit in milk. And they should remember the question posed by Abraham Lincoln in his debates with Stephen A. Douglas: "If you call a dog's tail a leg, how many legs has a dog?" When the audience shouted "Five," Lincoln retorted: "Not at all! If you call a dog's tail a leg, that does not make it a leg."

Provision should be made to withdraw licenses from those who prove unworthy professionally, but such power should be guarded from political or other abuse.

Apart from the personal principles common to gentlemen in all professions, the essence of ethics among chemists is this: Their data should be of sufficient accuracy to serve the case in hand and to stand check and recheck; and the conclusions drawn from the data should be temperate, justifiable, and directed toward honorable and legitimate objectives. The professional quality of the men practicing any profession must always determine the public's regard for it as a whole.

William C. Geer

Consulting Chemist, Ithaca, N. Y.

In principle I am opposed to the licensing of chemists by the state. It would be another case of inadvisable regimentation. Industrial leaders can select and control chemists far more skillfully than can any state bureau.

I admit a need for standards of practice on the part of those chemists who work in connection with foods, drugs or other materials which may be taken internally or applied externally by human beings. The same comments apply to those who do any sort of laboratory work upon human secretions or parts of the human body. If a law for this group only were to be enacted, I believe that the chemist should be required to renew his license, by re-examination, every five years. I favor such re-examination for renewal of license for physicians and surgeons.

H. O. Chute

Consulting Chemical Engineer, New York, N. Y.

As one who has been a licensed N. Y. state professional engineer ever since the law was passed, it seems useless and inadvisable for more "meddling" in the professional line in the states or by the federal government. During the many years we have held the license and have continued to contribute $1.00 annually to have it renewed, we have never had a client (or prospect) who ever asked whether we were licensed or not or who seemed to care about it.

The absurdity of licensing is shown by the fact that a Ch. E. would be legally entitled to act as engineer in building the Empire State Building, while a bridge engineer could be legally intrusted to superintend an explosive plant.

Presumably a metallurgical chemist could be intrusted in a study on drugs or on biological chemistry and so a biologist might be called on to pronounce on the cement mix for public road building. The chemist's report is like a prescription. You can take it or leave it.

Howard B. Bishop

Sterling Products Co. Easton, Pa.

This is a controversial subject which it would seem advisable for one in my position not to enter into. There are a few fundamental, basic things that we ought to control before we try forcing people to adhere to a certain standard. From my point of view it seems preferable to teach people to do certain things because it is profitable for them to do it and to have the motivation come from within rather than from without.

L. P. Weiner

Hiram Walker & Sons, Peoria, Ill.

Chemists should not be licensed. The American Society of Mechanical Engineers, to which I belong, has discussed the question of professional engineers licensing for several years and I am opposed to such requirements. We have all seen abuses of the professional licensing law in various states and I do not think there are any advantages that would compensate for the possibilities of abuse. The majority of chemists are engaged in industrial work and the few that are in independent consulting practice have their qualifications well known by those who would use their services. The point is not one of protection to the public.

CONSIDERABLE space in our daily newspapers is devoted today to accounts of dictator nations feverishly working to utilize wastes and to the development of "ersatz" programs. With the greatest natural resources in the world have we in the United States failed to properly utilize our industrial wastes? Drawing on nearly a half century of varied experiences, H. O. Chute reviews our efforts to convert wastes into valuable and profitable materials. Outstanding experts in subsequent articles will review in greater detail developments in special fields—a highly enlightening symposium on the subject "Wealth from Waste."

Wealth From Waste

Cane Sugar • Ethyl Alcohol • Corn Starch • Soda Process • Sulfate, Sulfite Processes • Sewage • Bittern • Garbage • Slag •

THE Germans are perforce frugal. By inclination and training they make much of this necessary virtue. Their Ministry of Science stages a sensational *ersatz* campaign broadcasting their "triumphs" from the housetops while burying their failures in the cellar. They thus create the impression that they have a monopoly on chemical brains.

Then their Ministry of Propaganda and Public Enlightenment whines that they are down-trodden, encompassed people—the "have nots"—and points out the tremendous labors that they must perform to provide necessities for their increasing population, stimulated by government.

These National Departments might have collaborated in writing a recent book on this double theme. It is called "Wealth from Waste."[1] Perhaps by implication we profligate Americans—greatest of the "have" people—are dumb wastrels. Are we? Let's see.

It has not been necessary for us to economize as it has been for some other nations, yet we have, during our progress on this continent, been converting into valuable products those things that we formerly considered waste. Most chemical reactions produce two products. One might be used; the other discarded. When the value of the latter is realized and its controlled production is added to the industry—usually through chemical research—then it is no longer waste, although it may remain a by-product.

As a dendro-chemist, the author is more familiar with forest products than with other fields of industry. When our ancestors landed on these shores they were confronted with impenetrable forests that baffled the Indians with their crude stone tools and kept them hunters rather than farmers. The squaws managed, however, to plant some corn and beans, and later tobacco.

One of the first jobs to which the Pilgrims applied themselves was cutting the forest as a nuisance. The tree trunks were burned to get rid of them, but soon it was found that the ashes could be leached and would yield "pot-ashes," which were first used for making soap and later exported. In a previous article[2] the author has shown that before the potash from the German mines was recognized as of fertilizer value, all the potash used in Europe came from the trees the pioneers felled to make farm fields. This potash was unquestionably a by-product chemical and was an important source of cash income for the pioneers.

Leather was tanned in New England at an early date, probably with oak and perhaps with hemlock bark. These barks were not by-products. They were principal products until the development of the lumber industry. Today oak and hemlock have lost their place to spruce extract, a concentrated by-product of the sulfite pulp industry. Chestnut extract largely from dead wood might or might not be considered a by-product. Some extract the tans and use the extracted chips for paper making. Other extract the wood and burn the waste as fuel. In the first case paper is the principal product and chestnut extract the by-product. In the second case the principal product is the extract. It is plain that what is the by-product depends on who is working it.

Beginnings of Naval Stores

Shortly after the settlement of Jamestown an industry of naval stores sprung up. The manufacture of pine tar and rosin from the pitch pine of the South rapidly displaced "Stockholm tar" and "Archangel pitch" as well as the older French and Italian turpentines. Painters still use "Venice turpentine," now mostly made in North Carolina.

As pine forests were cut down along the Atlantic seaboard, stumps and residual "light wood" (which is very resinous), were used in the kilns. Later retorts were introduced and "wood turpentine" and rosin oils were so made; but they did not become popular. When the process comprising chipping the wood, steaming it to remove turpentine, and then Sohxlet extracting it with gasoline to remove rosin was introduced, these products became more usable, but most plants were financial failures. It is only comparatively recently that this industry has revived after being taken up by people who had laboratories and a disposition to use them. Chemical research has saved this industry and brought

Some Thoughts

On Why Is a Product and Which Is a Waste

By H. O. Chute*

Meat Packing • Cotton • Soap • Paper • Coal Distillation • Wood Distillation • Cotton • Sweet Potato • Solvent Recovery •

it to its present status. The logs and stumps used to be waste, but now they are a source of profit.

Wood distillation began when the first savage built a fire in his cave, covered it at night, and found charcoal in the morning. He probably used it first to paint his face, and thousands of years later his descendants used it to smelt ores. They continue to use it to smelt iron ores in Sweden to make the highest quality steel for ball bearings and thin razor blades; but we want tonnage, not quality, and have almost abandoned the use of charcoal. This, together with synthetic methyl alcohol, acetic acid from calcium carbide, and acetone by the Fernbach fermentation process and from waste petroleum refinery gases, has about destroyed the wood distillation industry. But the utilization of an industrial waste (refinery gases), is thus helping to preserve a natural resource (forests) of the nation.

Development of Solvents

During the great war England was short of acetone for smokeless powder and introduced the Fernbach (or Wisemann) process. When the war was raging, the accompanying butyl alcohol was considered useless and was wasted. We, in this country, were then short of amyl acetate for airplane dope, but no one would use butyl acetate. A few years later the varnish makers began to employ it, and now it is used in larger quantity than amyl acetate, which now, is also a by-product of the petroleum industry. Both butyl alcohol and pentane were wastes during the war. Now they are essential raw materials for several industries.

For hundreds of years paper was made chiefly from rags. The ragman was a recognized factor. What he got was waste. Something less than 100 years ago it was found that paper could be made from wood pulp. This pulp is sometimes made from waste wood; that is to say, wood that is not suitable for saw timber. During the war spruce was used for airplane struts, while the slabs and crooked wood went to rotary barkers and chippers and then to the digesters to be made into wood pulp. For many years hemlock was peeled for barks, sawed for timber and the part that did not make good boards was delivered to sulfite pulp mills. Which part of the wood or which industry should be said to be working up waste depends upon the point of view.

Waste liquors from pulp mills were formerly discharged into nearby streams, thereby creating a nuisance—smelling up the countryside and killing all the fish. Since spruce, one of the best and most widely used pulp woods, consists of about 60 per cent. cellulose, 30 per cent. lignin and 13 per cent. pentosans and only the cellulose is converted into pulp, the quantity of waste discharged by a pulp mill is considerable.

In the soda process about eight-tenths of a pound of caustic soda is used per pound of pulp manufactured. This caustic soda constitutes a very substantial cost of operation, and for this reason it is recovered. The waste liquors from the digesters are evaporated and burned to char or "black ash" in suitable furnaces and the char is then leached with warm water to remove soda in the form of sodium carbonate, which is then recausticized by well-known methods used by the old LeBlanc soda process workers in England.

The leached char resulting from the soda recovery operation provides a material useful for the manufacture of activated carbon, which in turn finds large use in the purification of potable water, sewage and mill effluents. Thus, we have a product made from a waste material, which for years was a source of pollution, used for the removal of products of such and similar pollution from streams utilized as sources of potable water.

Products From Sulfite Process

The sulfite process, which produces one of the strongest fibres, comprises digesting the chips with bisulfide of lime, which is produced by running sulfur dioxide vapors through quicklime sludge or through towers filled with limestone. Originally, the waste digester liquors from this process were likewise a nuisance and a source of stream pollution. About thirty years ago they began to be concentrated and used as a core binder for foundry work. Later, this waste was found good for sprinkling on roads and still later it was turned into a tanning material. Lately, processes have been developed through chemical research whereby the calcium sulfite is largely returned to the digesters, the lignin is precipitated with more lime and treated to produce vanillin and lignin plastic. The entire world's consumption of this flavoring extract, however, can be produced by just one pulp mill.

Among other products of commerce made from pulp mill waste may be included plastics, sulfate wood turpentine, cymene, tail oil, fatty acids, alcohols and many others, all evidence of the making of wealth from waste.

A by-product of the cane sugar industry which has not only brought wealth from waste but has been the foundation of one of our outstanding new industries

* Consulting Chemical Engineer, 52 East 41st Street, New York.

is bagasse, which, for a number of years, has been successfully used for the manufacture of insulating board.

Use of Cotton Linters

Cotton linters were almost absolute waste. Today they are an outstanding source of raw material for the rayon industry. Many of our Southern states still have laws on their books prohibiting the discharge of cotton seed in the streams. However, since 1888 the utilization of cotton seed meal and cotton seed oil has raised the value of the seed to about that of the same weight of corn. Hydrogenation of cotton seed oil has produced food products of high nutritive value. The cake is a valuable feed for dairy cattle and is used largely by Northern dairymen as a winter feed. All of these products evidence the making of wealth from waste, and the progress of chemical technology during the past 50 years.

Corn is the outstanding American crop. Most of it is used for farm feed, primarily for hogs, and then there is no waste. A lesser quantity is used in the production of alcohol. A 56 pound bushel of corn will produce 5 gallons of proof alcohol (whiskey) or 2½ gallons of spirits. There will remain about 18 pounds of solids, one-half of which will be soluble and the other half insoluble. The insoluble portion is called bran. United States Patent No. 963,275 describes a method of recovering both the soluble and insoluble portions as dry cattle feed. This feed will sell at about the same price as corn and its production will avoid stream pollution. In this case, wealth from waste comes two ways—by bringing the distiller a cash income for waste product, and by saving the State and municipalities making use of the streams the cost of treating the water to remove pollution, either for the protection of fish and game or for utilization as a source of potable water.

So we see that in the present state of technological development and chemical progress, it is no simple matter to say what is a waste or to distinguish clearly between by-products and main products. It depends upon the point of view. Today's waste becomes tomorrow's by-product, and next year may be the main product of an industry we do not have at the present.

It is foolish of us to blame the pioneers for wasting the forests to make farm land. They really didn't. It is just as silly for us to speculate upon the materials which we now consider wastes but which future generations will use. The acid test is the market. If you cannot sell it or turn it into a usable product it is a waste. Finding markets for cheap wastes is one of Chemistry's major contributions to mankind, and the American chemist has met the changing economics of this vast, rapidly developed continent in ways of which we may all be proud. And in wastes, by-products or main products, 50 years makes a whale of a difference!

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[1] *Verwertung des Wertlosen*, by Ungewitter and others.
[2] Chemical Industries, *40*, 30 (1937).
[3] Ind. Eng. Chem. News Ed. 1930, 224.

Industry's Bookshelf

A. I. Ch. E.; Transactions, Vol. 34 (1938), published by the A. I. Ch. E., N. Y. City, $10.00. Dedicated to the memory of Fred C. Zeisberg, volume includes contributions read before the meetings of the Institute held during the 12-month period, Nov., '37-Nov., '38. Although containing a number of technical papers, the work as a whole contains material so well presented and timely that every chemical executive should have it at hand.

Manual for Executives and Foreman, by E. S. Schell and F. F. Gilmore, McGraw-Hill, N. Y.; 185 pp., $2.00. A couple of M.I.T. business teachers talk turkey with operating managers on costs, output, labor relations, etc.

Wealth vs. Money, by Ernest G. Woleslagel, House of Field, N. Y.; 117 pp., $2.00. A distinctly stupid try at sugar coating a vitriolic attack on "Wall Street."

The A B C of Accounting, by Stanley Edwin Howard, Princeton Univ. Press, 320 pp., $3.00. Very little of bookkeeping technique, but a great deal of accounting principles which any executive will find easy and valuable reading.

Rancidity in Edible Fats, by C. H. Lea, Chemical Publishing Co., N. Y.; 230 pp., $4.00. A scientific study of the causes of rancidity with practical tests and preventive measures prepared for the British Food Investigation Board.

Leather Finishes, by J. S. Mudd, Chemical Publishing Co., N. Y.; 113 pp., $4.25. A first-class manual covering the subject from raw hide to industrial methods of finish application to the tanned leather with many good formulas.

Dictionary of Scientific Terms, by C. M. Beadnell, Chemical Publishing Co., N. Y.; 285 pp., $3.00. A good deal more than a dictionary and a lot less than an encyclopedia—a useful handybook.

Piping Handbook, by J. H. Walker and Sabin Crocker; McGraw-Hill, N. Y.; 898 pp., $6.00. A needed third edition brought to date of this invaluable work for engineers in power plants, distributive systems oil, water or gas, and for chemical plants.

Essentials of General Chemistry, by George D. Sears; Internat'l Textbook Co., Scranton; 413 pp. A straightforward job of first principles simply expounded in a notably clear style with capital leading questions and supplementary reading lists.

How to Get What You Want, by Wm. C. Clifford; Ralston Society, Meriden, Conn.; 147 pp., $2.50. Soft soap and ginger dished up with psychological trimmings.

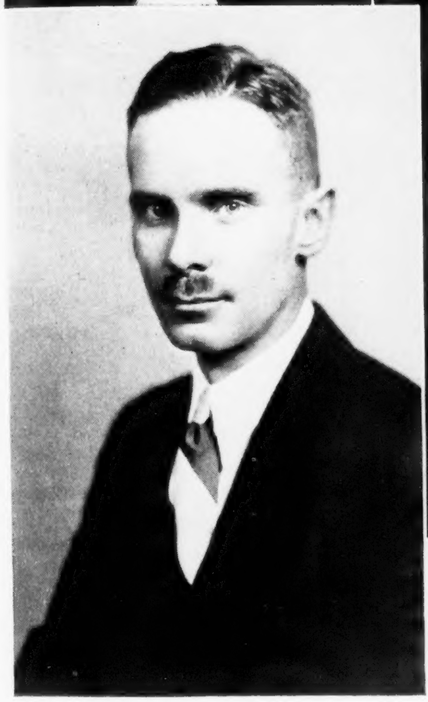
Industrial & Labor Relations in Great Britain, edited by Frank E. Gannett and B. F. Catherwood; America's Future, Inc., N. Y.; 364 pp., $2.50. With an older more serious labor problem than ours England in the past dozen years has cut down strikes to 2% of 1926 and the men actually handling labor relations tell in this invaluable symposium how and what this has accomplished.

Wool and The Wool Trade, by Alston Hill Garside; Stokes, N. Y.; 331 pp., $2.50. From sheep to suitings, the story of the wool industry with special reference to wool marketing and the N. Y. Wool Top Exchange.

Traité de Chimie Organique edited by Prof. Victor Grignard and associates; Vol. 10, 800 pp., 270 fr., Masson et Cie, Paris, France. Masterly treatment of the entire theory of acid function, presented in great detail.

"Headliners" In the News

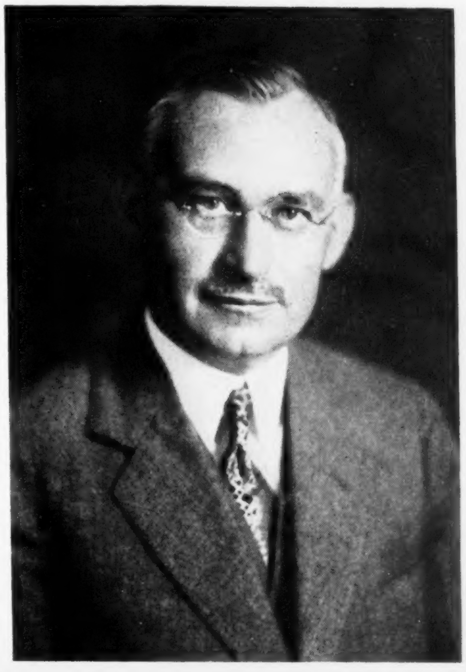
Chairmen: Celebration of the centenary of the discovery of vulcanization of rubber by Charles Goodyear will be a chief event of the 98th meeting of the A. C. S., to be held in Boston, Sept. 11 to 15. Above, Dr. James B. Conant, president of Harvard who will be honorary chairman; left, Dr. Gustavus J. Esselen who has been named general chairman.



Promotions: Lukens Steel announces promotion of L. M. Curtiss, left, to the post of general superintendent, and of J. Frederic Wiesl, above to the left, to the position of general manager of sales.

Promotion: Right, T. J. Knapp, newly-appointed assistant sales manager of Freeport Sulphur.

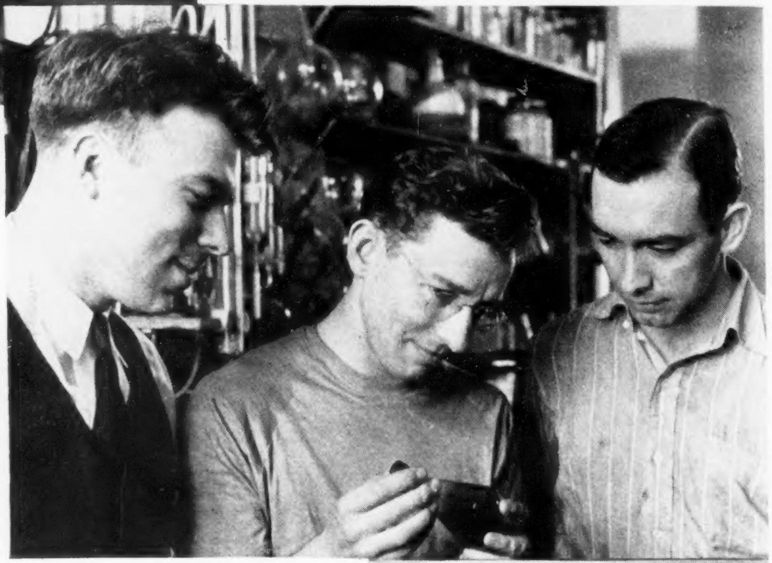
Now a V.-P.: Leslie S. Gillette who resigned as U. S. I. advertising manager to become executive vice-president of Hazard Advertising Corp.



Honors: Dr. Charles M. A. Stine, vice-president in charge of Du Pont's research, who will address the 2nd International Chemical Engineering Congress in Berlin, June 23, 1940.

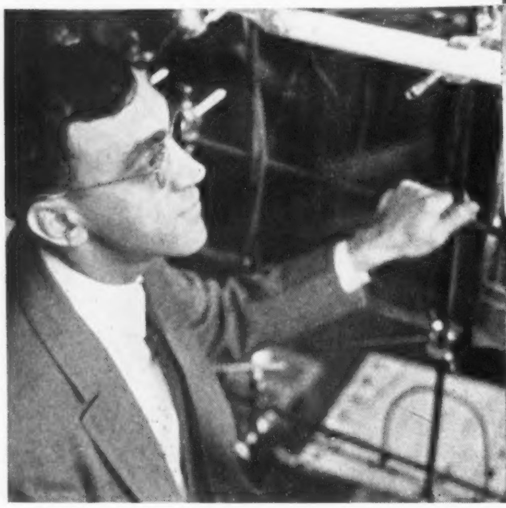
Technicians

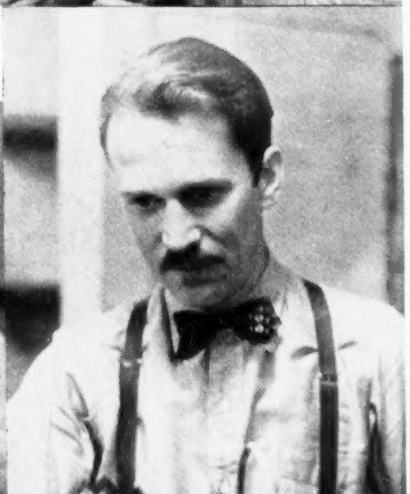
The balance room for elementary quantitative analysis in the Chemistry Department. The most interesting feature is not clearly shown—the balances are at stand-up height. This speeds the work and increases accuracy.



Nelson W. Taylor, Head of Ceramics Department, formerly of California and Minnesota; right, three Du Pont Fellows at Penn State, L. Plambeck, Jr., Illinois; E. Rohrman, Oregon State; J. S. Whitaker, Emory.

Below, J. H. Simons, in charge of physical chemistry, formerly of Illinois, California, and Northwestern. His work in the organic chemistry of fluorine is attracting much attention industrially.





Left, J. F. Krawiec examining a test piece used to measure the practical effectiveness of laundry operations; above, J. G. Aston, Professor of Organic Chemistry, also in charge of the Penn State Cryogenic Laboratory, the best low temperature laboratory between Berkeley, California, and Leyden, Holland.

In Training

The Candid Camera at "Penn State"

Above, Grover C. Chandlee, Head of the Chemistry Department, and Frank C. Whitmore, Dean of the School of Chemistry and Physics and Research Professor of Organic Chemistry. Dean Whitmore is a former president of the American Chemical Society.

The Dean looking at the plans of the recently completed 1,700,000 cubic foot building, providing additional space for the work of the School of Chemistry and Physics. Its present four buildings will continue in active use.

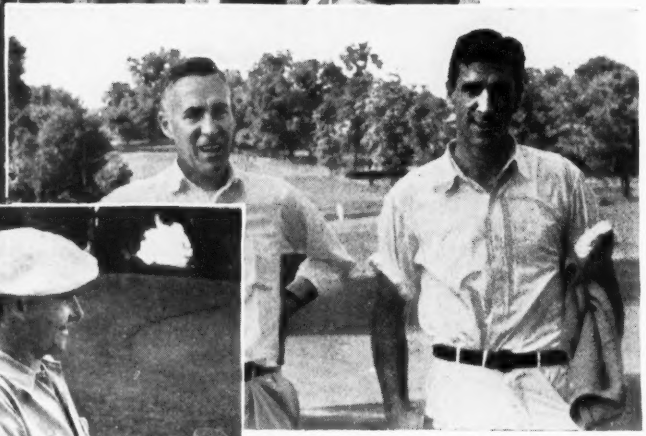
Merrell R. Fenske, in charge of petroleum refining research and Director of the Division of Industrial Research of the School of Chemistry and Physics.

Grover C. Chandlee, Head of Chemistry Department.

David F. McFarland, Head of Metallurgy Department, formerly professor at Illinois and Kansas, probably the longest known and best loved chemist on the Penn State Campus.

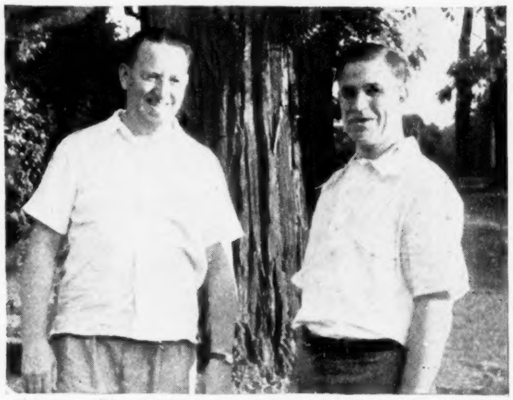
Alfred W. Gauger, Head of Fuel Technology Department and Director of the Mineral Industries Experiment Station, formerly of Princeton, Minnesota and California.

Chemical Salesmen Invade Long Island



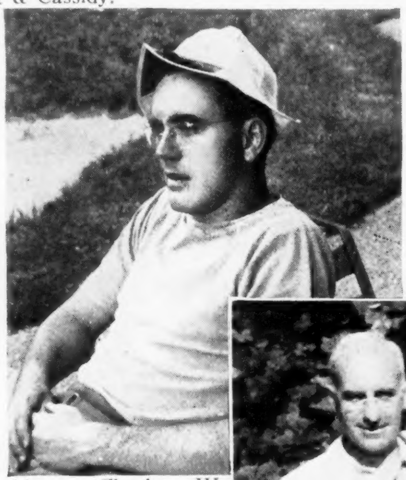
Standing on the porch (at the top) "Tony" Cirino, Industrial Chemical Sales Division, West Virginia Pulp & Paper; "Joe" Wafer of the same company and president of the Chemical Salesmen's Association; "Bill" Genge of "C. I."; and "Luke" Luaces, consultant. Directly above, Major R. H. Dufault, R. & H. Chemical Division, DuPont; and L. Swentzel, Wilmot & Cassidy.

Barkley Eakins, J. S. & W. R. Eakins Co.; Charles Slater, J. T. Baker Chemical.



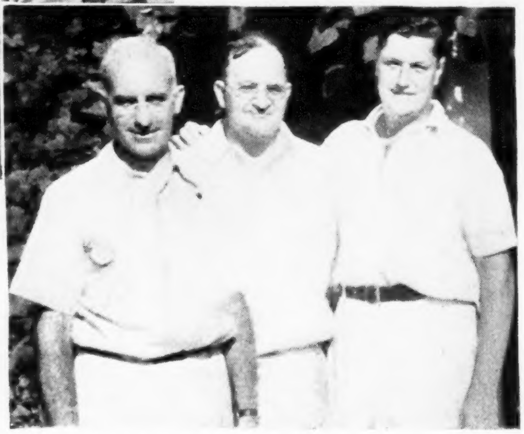
Above, Frank Edwards and George Smith both with Philipp Bros.

Lee Kolker, Elko Chemical.



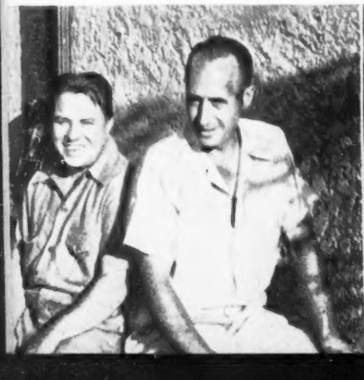
Above, Charles W. French, Jr., Oldbury Electrochemical.

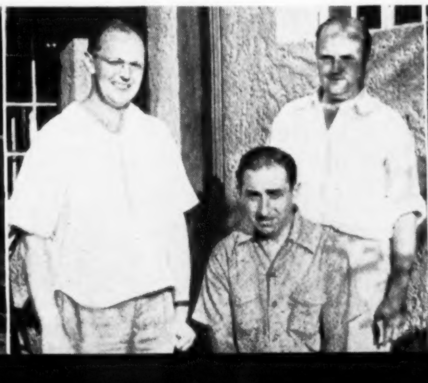
Above, Fred Koch, Dow Chemical, and left, "Jim" ("Fire Chief") McInnes, Commercial Solvents.

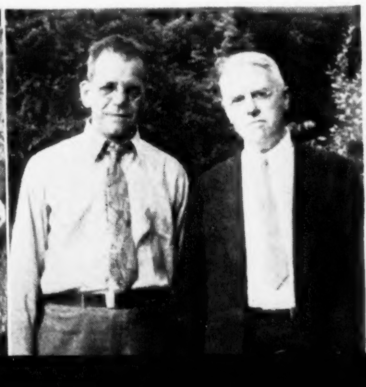


Ira Vandewater, R. W. Greeff & Co.; "Jack" Eldridge, Virginia Smelting; and Joseph A. Huisking, Fritzsche Bros.

"Shorty" Wyatt, Warner Chemical; "Tommy" Thompson, Mathieson Alkali; C. S. Sliger, Commercial Solvents; "Ford" James, Towns & James; Herman Bercow, H. H. Rosenthal Co.; W. Bjork, L. Sonneborn; "Sid" Klein, Calco; and "Bob" Gould, Heyden Chemical.

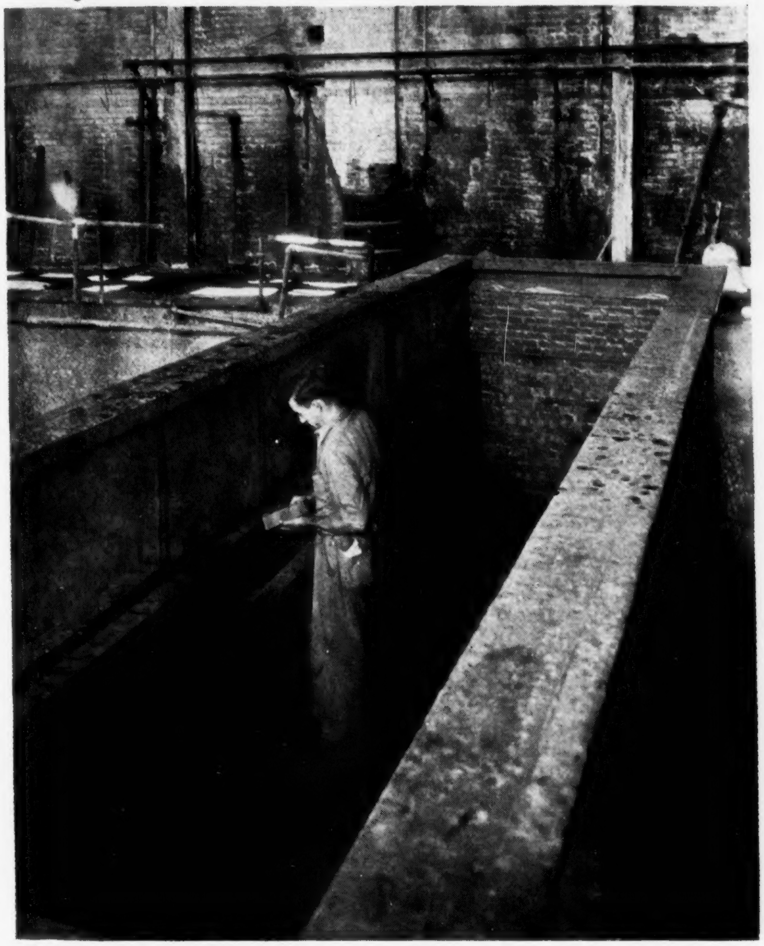






Plant Operation and Management

A digest of new methods and plant equipment



Installing a double-course sheathing of acid-proof brick laid in specially formulated acid-proof cement.

Evaluating Corrosion-Resistant Construction Materials

Part II

By J. M. W. Chamberlain

MR. CHAMBERLAIN, manager of the engineering division of U. S. Stoneware Co., continues his discussion of some of the important corrosion-resistant materials of construction. He first reviews very briefly the advantages of carbon brick, and then devotes the balance of the article to corrosion-proof masonry, "acid-proof brick" and "slabs," and the various types of industrial cements used in construction.

CARBON brick have excellent resistance to most all acids, alkalies, and salt solutions, except hot solutions of highly oxidizing character. Due to the low co-efficient of expansion and high conductivity of carbon brick, they are frequently used where maximum resistance to thermal shock or high thermal conductivity is required. Ordinarily, carbon brick would not be used as an over-sheathing for lining vessels, due to the high conductivity of the brick, necessitating an abnormally thick lining in order to produce a sufficiently high temperature gradient between solution temperature and lining temperature. There is, however, a specific type of job which requires the use of carbon brick sheathings.

Whenever hydrofluoric acid, or mixtures of hydrofluoric and other acids must be handled, ceramic brick cannot be used, due to attack upon them by the hydrofluoric acid. If a sheathing is required in such a case for either thermal or mechanical protection, carbon brick, bonded with a special carbon sulfur-type of cement must be used. A large number of stainless steel pickling installations installed in the last few years have required carbon brick sheathings, as most stainless steel pickles involve the use of hydrofluoric acid.

A typical carbon brick has the following physical characteristics:

Tensile Strength	750 to 1250 Lbs. per Sq. In.
Crushing Strength	2500 to 4000 Lbs. per Sq. In.
Transverse Strength	1500 to 2500 Lbs. per Sq. In.
Coefficient of Thermal Expansion per ° C. (26° to 200° C.)	
Longitudinal	.0000016
Transverse	.0000040
Thermal Conductivity Average up to 675° C.	.016 Gm. cal./Sec./Cm.²/° C.
Max. Safe Temperature under Oxidizing Conditions	375° C.
Apparent Density-Average	1.56
Porosity-Approximate	25%
Weight per Cubic Foot-Approximate	100 Lbs.

Corrosion-Proof Masonry

The field of corrosion-proof masonry is a very important one. In years gone by, practically all large corrosion-proof equipment was constructed of acid-proof brick and cement. The many mechanical and chemical failures of all masonry corrosion-proof equipment have today limited its general use to construction

of towers and stacks. The fact that acid-proof brick and cement over-sheathings are a necessary adjunct to many pieces of lined equipment has continued the importance of a knowledge concerning both brick and cements for acid-proof masonry work. The total volume of acid-proof brick and cement used today for over-sheathings of lined tanks is considerably greater than the amount of these materials formerly used in all masonry construction. For many uses involving high temperatures, or for protection against mechanical abuse, such lining materials as rubber, synthetic resins, asphaltic base linings, etc., require the over-sheath brick and cement construction.

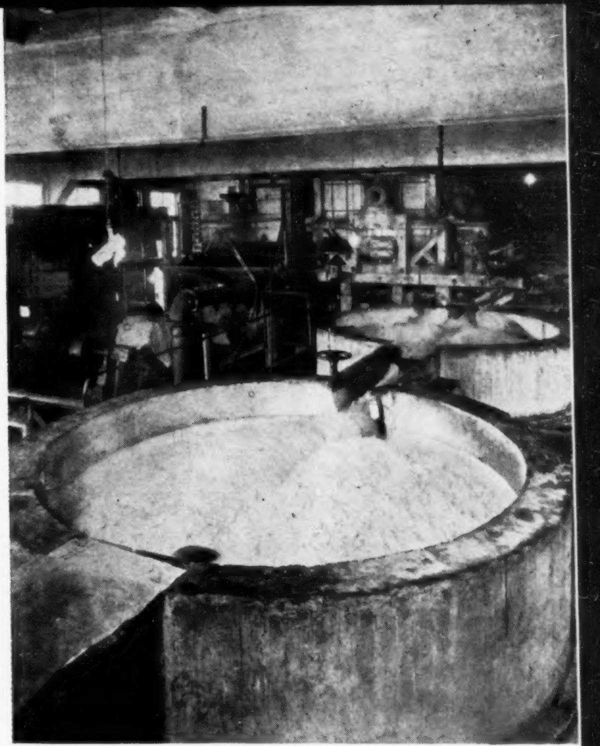
Not infrequently purchasers of lined vessels allow the supplier of the vessel to specify and supply a suitable grade of lining material and its method of application, but purchase and themselves apply the over-sheathing materials. For this reason it is necessary that users have a very definite working knowledge of the physical and corrosion-resistant properties of both acid bricks and acid-proof cements. In large tanks used at elevated temperatures, the mechanics of satisfactorily installing a suitable grade of acid-proof brick and cement are rather involved, and should not be attempted by those who have not had considerable experience in this type of work. Almost every brick sheathing represents a mechanical design problem of its own, for a workable design must provide for expansion strain relief, off-set joints, and many other details. There are no acid-proof bricks or cements which are applicable to every problem, and hence, it is desirable for the purchaser of these materials to know the capabilities of each type.

"Acid-Proof Brick" and "Slabs"

A great variety of acid-proof brick are available. Qualities, as well as prices of the various grades, cover a wide range. The selection of a suitable brick is best left to the judgment of those having wide experience with acid-proof installations. It is virtually impossible to write specifications for brick, to be used in corrosion-resistant work, that are broad enough to cover all types of service. An inexpensive brick which might perform perfectly in one service, may fail completely in a month's time when used under different conditions. The necessity of having several grades of brick is recognized by many suppliers. It is economically unfeasible to insist that a user buy one grade for every purpose. For example: a lining for a tank used in electrolytic refining of rare metals requires brick which cost approximately twenty (20) cents apiece, while some dilute acid wash tanks can be very satisfactorily constructed from brick costing two (2) cents each.

A few generalizations may be given that apply to acid-proof brick in general:

1. Acid brick made from clay bodies cannot be used with solutions of hydrofluoric acid or salts of this acid Carbon brick should be used for such services.
2. Acid brick made from clays will all be subject to a certain amount of disintegration when used with hot caustics of appreciable concentrations. Carbon brick are suitable for this service, but are expensive. When alkalies are present, the brick manufacturer's advice as to the suitability of this product should be obtained.
3. Regardless of the grade used, only the hardest burned brick of that particular grade should be considered. Various clay bodies reach maturity at different burning temperatures. The fact that a brick has been burned at a high temperature, is not necessarily proof of its fitness. It must have been burned at a temperature that assures essentially complete vitrification for the particular body from which it was made.
4. In so far as possible, brick should be true and uniform in size. It must be borne in mind, however, that brick of very low or near zero porosity are frequently subject to some burning warpage.
5. Acid brick should be free from iron compounds, other than iron silicate. For some purposes, iron silicate content may be as high as 7%, while in some other cases it must be less than 0.5%.
6. Where bricks are used in the presence of soluble salts, they should be of low porosity, otherwise spalling from salt absorption is liable to take place.
7. Brick bodies must be resistant to the materials they are to handle, with or without a glaze. Glaze is not of any value in protecting an otherwise unsuitable brick. Glazing is only of value on exposed surfaces in order to facilitate cleaning.
8. There are no standardized tests for corrosion resistance. Reputable brick manufacturers are, however, in a position to give relative corrosion resistance figures. The most enlightening tests are made by Soxhlet extraction of a comprehensive brick sample carried out with the corrosive liquor that the brick will be required to handle.



High acid-proof brick-lined tanks in the continuous bleaching system at the plant of the Oregon Pulp & Paper Co. The brick outline on the inside of the tanks has been obscured through use.

Many acid brick in the less expensive grades are known to be of the same type as those sold for building, paving, or refractory purposes.

As a rule, these brick, when sold for acid service, bring a slight premium over the corresponding commercial grades. A premium price is fully justified, and covers the additional costs of the special burning and close sorting that is necessary. Very few run-of-mine building, paving, or refractory grades are suitable for acid service, and those that are, must receive special burning and culling attention.

The two most common sizes of brick used for acid-proof masonry construction are known as the eight-inch and the nine-inch series. Eight-inch series measure 8"x4"x2¼", while the nine-inch series are 9"x4½"x2½". Special shapes are also available in some grades. In most cases, standard brick shapes are used for the sake of economy. Occasionally thin slabs are used which cover a larger surface than standard brick. These slabs are sometimes cored out along their longitudinal axis to lessen their weight or to make them more effective as insulating sheathings. Internal coring is a mixed blessing. If liquids seep through a defective joint, changing liquid levels in the vessel cause a surging of liquid in the core cavities which may wash out the cement joints.

The cost of such slabs or large tile is greater per square foot than brick. Slab linings lessen the lineal footage of cement joints, and for thin lining work they can sometimes be held in place better than small thin brick. Careful design is required to satisfactorily use slabs, for their relatively great weight imposes a tremendous bonding strain on the joint cements. In services where temperature fluctuations are frequent, slabs are seldom desirable. These large pieces expand and contract as individual units, and due to their large size, the dimensional changes are relatively great and must be absorbed by a few cement joints. Slab construction should never be used without an impervious corrosion-resistant membrane back up, as thermal stresses are apt to loosen the cement joints and a membrane leakage barrier is required. For this reason, it is preferable to use a construction which mechanically locks the slabs in place rather than depending on cement joints to perform the dual function of sealing and holding in place.

A modification of slab construction is found in Jenssen tile (18"x9" clincher back) used to line Jenssen towers for pulp mills. These tile are readily locked into a cement back wall. Jenssen tile are primarily required to resist abrasion and are only subjected to mild corrosive attack.

Thin 4"x4" or 6"x6" glazed tile are sometimes used as a lining material for mildly corrosive services where a readily cleaned surface is required. The joints are frequently pointed with an impervious resin cement. The installation of such tile should only be attempted by expert masons.

"Acid-Proof Cements"

The term "Acid-Proof Cements" is somewhat of a misnomer, in that these materials are, as a rule, used as acid-proof masonry bonding mortars. There are a variety of acid-proof cement types in general use. The cements, like lining membranes, have rather specific fields of application, and none of them are "cure-alls" capable of universal use in all corrosive services. It should be borne in mind that acid-proof cements, at best, have lesser resistance to chemical attack than high-quality acid-proof brick. The importance of careful selection in determining the proper cement for a given service cannot be over-emphasized. The proper cement, once chosen, must be carefully applied in accordance with the manufacturer's instructions. In general, it may be said that all acid-proof cements are somewhat tricky to use, and their serviceability can be easily reduced by improper installation technique. It should also be borne in mind that the best cement obtainable for a specific service cannot compensate for a poorly chosen acid brick. Not infrequently failures appear to be due to the cement, when in reality the brick have been at fault. Due to the interdependence of brick and cement, many large users of acid-proof masonry insist on one source supplying both of these materials and installing them, or supervising their installation.

Acid-proof cements can be divided into the following general classifications:

1. Silicate Types
2. Sulfur Base Types
3. Mineral Base Types
4. Resin Types
5. Rubber Base Types
6. Hydraulic, high-alumina Types
7. Litharge Glycerin Silicate Type

Of the seven varieties, the silicate, sulfur, and mineral base types are the ones most commonly used, the others having limited and rather specific applications.

The following information is pertinent to specific types, and will be found helpful when selecting a cement to be used for a given application.

"Silicate Cements"

Silicate cements consist of an acid-proof filler, bound with silicate of soda. The silicate cements which are most extensively used today, are made from patented mixtures containing fluoride accelerators, which shorten the hardening time, and improve their resistance to very dilute acids and water. The older silicate types consisted of only a siliceous filler to which is added a liquid silicate of soda. The silicate is added to the filler, either by the cement manufacturer, or on the job, prior to use. These cements require exposure to air, in order that the water in the silicate can evaporate, enabling the cement to set. In inaccessible places (for example: inner courses of masonry) these cements do not set, and hence, they are of limited value. While the old silicate cements are remarkably resistant to attack by concentrated acids, they are reasonably soluble in water or very dilute acid concentrations. The exposed surfaces of these older types of silicate cements require extensive acid treatment after setting, in order to give them even moderate resistance to attack by dilute acids and water. The shortcomings of the earlier cements have been eliminated in some of the newer types of silicate cements by the inclusion of the aforementioned accelerators, which caused the cements to set by chemical reaction, rather than by evaporation. It is now possible to obtain silicate cements which will take an initial set within ten to fifteen minutes at normal room temperature, with or without exposure to air. Some grades of silicate cements also contain chemicals which render them resistant to dilute acids and water, without requiring acid treatment after setting.

Silicate cements are available in two forms, one a powder that is mixed with the proper grade of silicate of soda, immediately prior to use, and second, a powder, which is mixed with water prior to use. The type which is mixed with water has the advantage that it is not necessary to bother obtaining the special grade of silicate of soda necessary for the first type, and it also contains ingredients which gives it superior resistance to solution in water.

All silicate cements have a relatively high porosity, and are generally used in conjunction with an impervious membrane, the function of which is to prevent capillary conduction of acid through the masonry joints to external structural members. Silicate cements should be definitely considered in the light of pervious bonding materials, which have excellent resistance to attack by all acids, except hydrofluoric, at all temperatures. It is recommended in all cases, however, that some membrane material be used to prevent seepage of acid through the pores of the cement, and thus come in contact with the steel, concrete, or plain masonry external walls. The nature of the membranes for this service is discussed elsewhere.

While silicate cements have no service temperature limitations, and are immune to attack from all acids, except hydrofluoric, and are resistant to solvents, they are quite readily attacked by alkalies. Some salt solutions that have a tendency toward excessive crystal growth, penetrate the pores of the cements and disintegrate them by mechanical spalling.

Silicate cements should never be applied during freezing weather. Their use at temperatures in excess of 95° F. so shortens their period of workability, that they cannot be applied before they start to set. Silicate cements should never be allowed to come in contact with Portland cement, as they will disintegrate it at the point of contact, and hence, disrupt the bond at this point. Portland cement surfaces are generally painted with asphaltic materials, or covered with membranes to separate them from silicate cement masonry work.

Silicate cements have excellent adhesion to all materials, unless the surfaces are covered with a film of soot or grease. They permit normal masonry construction, and no special equipment is required to apply them, a trowel and mixing box constituting all the necessary tools.

The advantages and disadvantages of silicate cements may be listed as follows:

Advantages.

1. Resistant to all acids, except hydrofluoric.
2. May be used at any service temperature.
3. Unaffected by solvents and hydrocarbons.
4. Develop a permanent, usable set in a short time (accelerated type).
5. Have high bonding power to all surfaces that are free from soot or grease.
6. Absolutely fire-proof.
7. Do not give off noxious or inflammable vapors during application or setting.
8. Permit intricate masonry construction and no specific equipment is needed.
9. Low coefficients of expansion.
10. Low cost.

Disadvantages.

1. Not resistant to alkalies, except for short periods alternated with long periods of exposure to acids.
2. Not as resistant to water and steam as some other types.
3. Have a relatively high porosity—14–35, depending upon the specific grade.
4. Suitable as a bonding medium only. Not valuable as plaster coat or membrane.
5. Cannot be applied at very low temperatures, or at excessively high temperatures. 50° F. to 90° F. is recommended temperature range during application.

Silicate cements are useful for general acid-proof masonry construction of tanks, towers, stacks, floors, and so forth.

Typical Physical Properties of a Silicate Cement

Compressive Strength	2100 Lbs. per sq. in.
Tensile Strength	325 " " " "
Bonding Strength	100 " " " "
Modulus of Rupture	448 " " " "
Dorry Hardness Test	.27
Shrinking Maximum	.004 in.-per in.
Coefficient of Expansion, in. pr. in. per ° F. Average 80° to 500° F.	6.4x10^{-6}
Absorption	14.29%
Dielectric Strength Dry	18 Volts per mil.

Mineral Base Cements

Mineral base cements are of a thermo-plastic nature and consist of selected asphalt and asphaltites mixed with inert fillers and fluxes. A modified type of emulsified cement is also available. Usually, mineral base cements are used by pouring or mopping the melted compound in place. They set by cooling. The emulsified type can be brushed or troweled in place and sets by evaporation of the emulsifying agent.

Mineral base cements are generally used for floor work, the bonding of inner masonry courses, or as coverings for tanks or vessels used in the storage of mineral base acids at normal temperatures.

Mineral base cements are unsatisfactory when used in the presence of oxidizing agents, hydrocarbons, or hot liquids. They resist non-oxidizing acids, salt solutions, and dilute bases satisfactorily. The resistance of the emulsified (paste types) is definitely inferior to that of the heat-and-pour variety.

While mineral base cements at one time were very widely used, they have in a large part been supplanted by silicate, sulfur, and resin cements. Some of the mineral base cements and other related products are still extensively used as membrane materials.

Advantages: 1. Heat and pour, ready for immediate use as soon as cooled; 2. impervious; 3. good adhesion to all clean surfaces; 4. low cost.

Disadvantages: 1. When used as a bond for brick, it is necessary to have separate lugs on the brick, or use chip spacers; 2. attacked by oxidizing agents and hydrocarbons; 3. thermo-plastic and tends to creep away from loads at elevated temperatures (it should not be used over 150° F.); 4. inflammable.

Sulfur Base Cements

Sulfur base cements are widely used for acid work, and while they are not useful in as wide a range of services as silicate cements, their complete resistance to solubility in water and dilute acids, as well as normal strength pickling solutions, make them very useful. They are frequently used to bond brick sheathings for rubber-lined or mastic-lined tanks in steel pickling service. These cements are practically impervious, and this factor not infrequently determines their use in preference to the porous silicate types.

Sulfur base cements are available in three types:

1. Consisting basically of a mixture of sulfur and siliceous filler.
2. A mixture of sulfur and carbon filler.
3. A mixture of sulfur, filler, and a small amount of synthetic rubber.

The first type is the one generally used for most acid services. The second type is used where resistance to hydrofluoric acid is required, and the third type when compounded with siliceous filler may be substituted for the first type, and when compounded with carbon fillers, may be substituted for the second type. The addition of rubber-like fluxing materials gives the cement a slightly improved behavior, both during application and in use.

Sulfur base cements are furnished in the form of solid lumps which are melted down on the job and poured into place. Bricks for use with sulfur base cements generally have separating lugs which hold them apart. A section of wall is laid up with bricks having separating lugs to provide mortar space, or chips are placed between the bricks to hold them apart. Exposed surfaces of the brick are covered with a temporary paper film and the molten sulfur cement is poured into the bonding space between the brick. It is desirable to have all sulfur joints in a tank lining cool down at the same time. This is frequently impossible, and a compromise is sometimes reached by keeping those portions of the walls that have already been poured and set as warm as possible during the pouring of the remaining joints. This precaution assists in the removal of strains between sections that have been poured at different times.

Advantages: 1. May be used immediately after installation (bond is made as soon as the cement solidifies by cooling); 2. non-absorbent; 3. not soluble in water; 4. low cost.

Disadvantages: 1. Handling of hot sulfurous materials is sometimes difficult; 2. sulfur base cements have a tendency to expand slightly on long exposure to acids; 3. sulfur cements will burn; 4. it should not be used continuously at temperatures of over 180° F. and intermittently at 200° F.

Sulfur base cements are resistant to those chemicals which do not affect sulfur, and, therefore, may be used with most of the commercial solutions and combinations of organic acids. Carbon bisulfide, even when present in very small quantities is injurious to the cement.

Resin base cements consist of synthetic or natural resins filled with inert materials. There are a wide variety of resin base cements available, and in general it may be said that they are impervious, have better than average bonding strength, and are resistant to most corrosive solutions which are not highly oxidizing or strongly alkaline. Some solvents attack this type of cement. The fact that they are impervious, and will withstand exposure to many acids and some bases gives them a value where it is necessary that the cement be completely non-absorbent, or in those cases where alternate exposure to acids and bases must be provided for.

Resin cements may be divided into three general classes: One is supplied in the form of a powder and a liquid which are mixed prior to use, and setting is developed by the interaction of the chemicals contained in the powder and the liquid. The second type is supplied in paste form, and sets by evaporation of the solvent, while the third type is supplied as a solid which is melted and poured into place. The first type is a hard, impervious cement which does not exhibit a marked thermoplastic character, while the last two types are impervious, but exhibit definite thermo-plastic characteristics when heated to temperatures much above 150° F.

Advantages: 1. Impervious; 2. can be used with both acids and bases; 3. have high bonding strength.

Disadvantages: 1. High initial cost; 2. some types spoil in storage prior to use, unless definite precautions are taken; 3. are attacked by oxidizing agents and some solvents.

The relatively high cost of resin cements generally confines their use to pointing the joints of masonry bonded with some other type of cement. These cements, or modifications of them, find extensive application as coating materials for vessels or equipment handling corrosive substances at normal temperatures.

Where corrosive conditions are not severe, and a cement with all of the structural possibilities of Portland is required, there is available a high-alumina cement which exhibits better resistance to acids and bases than regular Portland cement. This cement sets much faster and develops its ultimate strength in a shorter length of time than Portland. While this type of high-alumina cement is not in any way comparable to the other cements described herein in respect to its corrosion resistance, it is an available material from which to construct tank shells and equipment foundations which are exposed to corrosive fumes. With the exception of setting much more rapidly than Portland cement, and developing its ultimate strength in a shorter length of time, its working properties and method of application are identical with Portland cement and Portland cement mixtures. This cement may be mixed with silica aggregates to make concrete having the same physical characteristics as Portland cement concretes.

Litharge Glycerin Cements

Litharge glycerin cements consist basically of litharge powder mixed with glycerin. These cements were at one time used rather generally for mildly corrosive conditions, but silicate and resin types have largely supplanted them.

Booklets & Catalogs

Chemicals

A68. Annite, folder describing a new detergent powder, available in several grades, for all general cleansing and washing operations. Quigley Co., Inc.

A69. Caled Cleanser, July-August; lively and informative technical news in the dry-cleaning field, stressing methods of fire-proofing fabrics in this issue. Caled Products Co.

A70. The Chemist Analyst for June presents helpful, valuable short-cuts for commercial analytical techniques. Noteworthy is a short article, "The Micro Identification of Essential Oils." J. T. Baker Chemical Co.

A71. Durez Molder, June; an outstanding issue, carrying good editorial and photographic material; the lead editorial is timely and effective. General Plastics, Inc.

A72. Durez Plastics News, June; brings to the fore new packages fashioned from plastic materials, and contains ideas for the manufacturer of chemical specialties. General Plastics, Inc.

A73. The Dutch Boy Quarterly, Vol. 17, No. 2; describes the use of lead products in architectural and landscaping engineering. National Lead Co.

A74. Dyes, an excellent elementary presentation of the "why" and "what" of dyes and dyeing, prepared by Dyestuffs Division, Du Pont Co.

A75. Foote-Prints, June; the semi-annual magazine, and authority of the rare metals and fine inorganicals world, published by Foote Mineral Company.

A76. Mallinckrodt Chemicals, Revised Price Catalog as of July, '39. Mallinckrodt Chemical Works.

A77. The Merck Report, July; the valuable and professional journal of pharmaceutical research, of importance both to the drug manufacturer and to the producer of fine chemicals. Merck & Co.

A78. Modern Filtration, a clever, pocket-size booklet describing filter media prepared for the chemical processing industries by The Dicalite Co.

A79. The Neoprene Notebook, No. 16, presents the second in a series, looseleaf style, on the manufacture of industrial products from rubber and neoprene. Du Pont Co.

A80. Plastics Bulletin, the first of a new series published by the Plastics Dept. of the Du Pont Co., presenting novelties and last-minute developments in shaped plastic articles; folder is punched for handy, looseleaf note-making. Plastics Dept., Du Pont Co.

A81. Priorities, July; an excellent editorial and an unusually well written feature on copper make this number outstanding. Prior Chemical Corp.

A82. Silicate P's & Q's, July leaflet treats of the part played by alkali silicates in the formulation of industrial adhesives. Philadelphia Quartz Co.

A83. Witcombings, June, honors Charles Goodyear in this memorial volume, devoted to rubber and asphalt chemicals. Wishnick-Tumpeer, Inc.

A84. Monsanto Magazine, July; this is another in a series of consistently excellent editions of company's outstanding house organ. Monsanto Chemical Co.

A85. Schimmel Briefs, July; latest issue of the handy loose-leaf data sheet series, of value to the cosmetics formulator and the essential oil field. Schimmel & Co.

Equipment—Containers

E122. Aluminum News-Letter for June; one of the best-looking of company's issues of the Letter. Aluminum Co. of America.

E123. Autovent Fans, folder illustrating and describing installations of acid-moisture proof and vapor-explosion proof propeller fans, whose blades are protected by a new chemical coating material. Autovent Fan & Blower Co.

E124. Babcock & Wilcox Technical Bulletin, 11-B, contains specifications for seamless tubular products. Babcock & Wilcox Tube Co.

E125. Bagology, for June; continues to be one of the best in the group of periodicals issued by packagers. Chase Bag Co.

E126. Care and Use of Gas Masks, a bulletin of interest to industrialists concerned with the respiratory protection of workers. Davis Emergency Equipment Co.

E127. Colalloy Bulletin, No. 2639, shows the new line of buckets, trays, tanks, vats, steam-jacketed kettles, and other ware for the chemical industries; materials are of corrosion-resistant alloy about 66% lighter than steel. Colonial Alloys Co.

E128. "Comet" Hoists, folder illustrating a series of models of the light-weight, very compact electric hoist manufactured by Chisholme-Moore Hoist Corp.

E129. Conductivity Bridges and Dip Cells, leaflet including new models of bridges for 110-125 volts, 50-60 cycle operation, with a built-in 1,000-cycle source. Industrial Instruments, Inc.

E130. Coordinated Process Control, how to analyze a situation in which a uniform, high-quality product is desired at lower costs. The Bristol Co.

E131. Deaerating Heaters and Deaerators, folder describing the action of heat transfer equipment for large plant installations, made to order. Worthington Pump and Machinery Corp.

E132. Gorton Steam Venters, illustrated circular showing types of eliminator and by-pass valves for automatic venting of dryers, unit heaters, laundry equipment, processing equipment and the like. Gorton Heating Corp.

E133. High-Pressure Air Compressors, folder presents salient features of a line of two-stage compressors for starting internal combustion engines. Ingersoll-Rand Co.

E134. Hough Hydraulic Shovels, bulletin announcing new shovel attachments for tractors and trucks. Frank G. Hough Co.

E135. Humidity Recorders and Controllers, a new bulletin giving information on wet-and-dry bulb psychrometers. The Bristol Co.

E136. Inco, Vol. 16, No. 3, latest issue of the quarterly publication devoted to nickel and nickel alloys. Its editorial pages touch upon the application of these materials in their various forms. International Nickel Co., Inc.

E137. Insulation Resistance Testers, leaflet includes new models having a wide megohm range. Industrial Instruments, Inc.

E138. International Nickel Company Folder, contains basic information on mechanical, corrosion-resistant and other properties of rolled nickel and high nickel alloys.

E139. Jar Mills, Bulletin No. 250, describes single-, double-, and quadruple-jar mills, and accessories for same; specifications for the "Loxeal" line of jars are included. U. S. Stoneware Co.

E140. Low-Speed Synchronous Generators, loose-leaf folder illustrating new stators, rotors, and exciters. General Electric Co.

E141. Mechanical Topics, 2nd Quarter; well-illustrated notes for the fabricator of industrial process equipment. International Nickel Co.

E142. Modern Preparation of Water for Ice-Making, bulletin presents briefly advantages and details of equipment for water-purification in ice plants. The Permutit Co.

E143. Mosley Mill, a 12-page booklet containing dimensions and installation data on the new apparatus, in which dry materials are pulverized by attrition in an air-swept grinding chamber. Stephens-Adamson Mfg. Co.

E144. Nickel Cast Iron News, July, illustrates a number of nickel cast iron dies for hot processing and sheet metal work. International Nickel Co., Inc.

E145. Packers Digest, a catalog, fully illustrated, presenting the best points of a large number of packaging machines having wide ranges of applicability. Stokes & Smith Co.

E146. Permutit Desludging Valves, a folder illustrating and detailing a line of automatic desludging valves for hot lime soda softeners. Permutit Co.

E147. Phoenix Flame, June; 32 pages of handsome photographs, and editorial content, devoted to packaging and package styling. An excellent all-round and wide-awake commercial journal. Phoenix Metal Cap Co.

E148. Pyrometers and Resistance Thermometers, a 4-page folder containing brief descriptions of several of the most familiar instruments in the line of pyrometers put out by The Foxboro Co.

E149. Ring-Type Crusher, leaflet illustrates a novel design of crusher, wherein the material undergoes a cracking, rather than a crushing, action. Stephens-Adamson Mfg. Co.

E150. Strip-Chart Resistance Thermometers, a new bulletin describes instruments on which as many as 8 temperature records may be made simultaneously on one chart. The Bristol Co.

By-Product Sulfuric Acid

In *Chemical Trade Journal*, July 14, '39, p. 25, is described the low-cost manufacture of 70% sulfuric acid at the South Metropolitan Gas Co.'s plant in London, England. Waste hydrogen sulfide, from saturator exhaust gases, and by-product ammonia are separately oxidized; the resulting oxides of sulfur and nitrogen are then "chamber"-processed to yield sulfuric acid.

Over 15,000 tons of concentrated gas liquor are consumed annually, to yield 5,000-6,000 tons of 70% acid. Consumption of ammonia is calculated at about 1% on the sulfur equivalent of the acid yield. Unique feature of the process is the use of an auxiliary raw sulfur burner supplying sulfur dioxide to the towers during the Sunday shut-down of the sulfide gas supply.

Regeneration Metallic Oxide Catalysts

Cobalt-thoria catalysts, used in synthesizing hydrocarbons from carbon monoxide and hydrogen, may be reactivated in situ without chemical treatment, according to E. P. 500,264 abstracted in *Chemical Trade Journal*, May 26, '39, p. 507. Process comprises reacting the gases over cobalt-thoria at, or slightly above, atmospheric pressure. When oxides have lost their catalytic action to a predetermined degree, pressure of the entering gases is reduced to as low as 0.10 atmosphere for a short time to permit degassing of the solid oxide surfaces. Alternately, the flow of reactants is shut off and an inert gas (nitrogen) introduced for a specified period as predetermined by experiment.

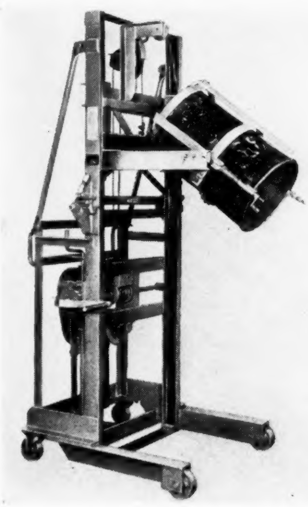
Slow-Setting Urea Glues

The addition of a substantial proportion of urea to commercial animal glues lowers the gelification point of the mixture without reducing its adhesive properties. Twenty per cent. by weight of urea lowers the gel point of an animal glue to 18 deg. C., 40% of urea to 10 deg. C., and 50% to 7 deg. C. In preparing these adhesives, the animal matter is dissolved in aqueous urea. (*Chemical Trade Journal*, June, '39.)

New Equipment

Drum Discharge Elevator QC 25

This device is a light, portable barrel and drum elevating and emptying truck. It is designed to handle round containers of a wide range of sizes, whether of wood, metal, fibre, or other materials. Container can be lifted to any practical height and contents emptied into hoppers, processing equipment, or trucks.

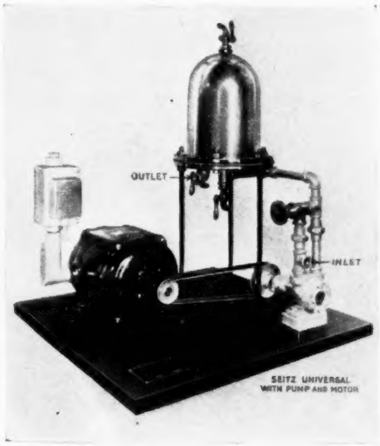


Mechanical clamp quickly and securely strips the container to the elevating arms and only a slight touch on the part of the operator is necessary to tilt the container after it has been raised to desired level.

Container clamp and the tilting mechanism can readily be adapted to other models of electrically, or manually, operated elevators already placed on the market by the manufacturer, who offers a complete line of like vehicles.

Small All-Purpose Filter QC 26

Overall dimensions of the model illustrated are: Height, 7¾″; diameter of base, 5½″, which includes outlet, inlet and drain cock. Manufacturer claims for this filter unusual capacities; at 2 or 3 lbs. pressure, 100 gals. per hour and, at 25 lbs. pressure, over 300 gals. per hour. The rate is, of course, less for liquids more viscous than water. Pressures up to 50 lbs. may be used, it is said.



Filter body proper consists of 2 inner cylindrical screens having a ¾″ space between them. In this space is inserted the desired medium, whether loose asbestos, pulp, charcoal, or other agent. It is solidly packed by means of a wooden cylinder of the same diameter as the space between the screens.

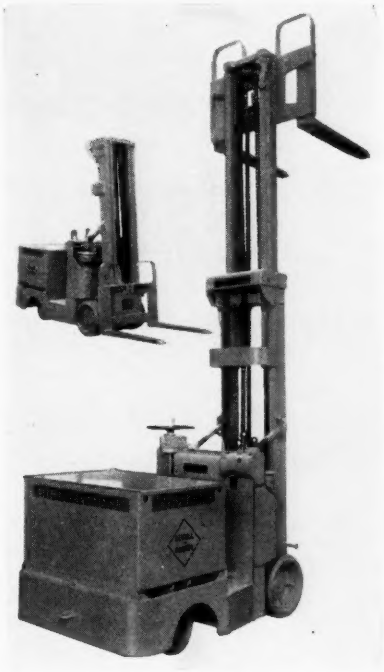
Standard construction is tinned bronze, with Monel screening, but the materials may be varied according to requirements.

Neoprene-Lined Hose QC 27

Eastern manufacturer of rubber products is now able to supply neoprene-coated gasoline hose in all sizes, 1¼″ to 3″. This tubing cannot discolor gasoline through bleeding or solution of the hose lining material. It is said that the constant contact with petroleum compounds has no effect whatsoever on the neoprene linings. Hose can be supplied for tank car and truck loading and for gasoline service pumps.

Heavy Duty Lift Truck QC 28

A new, compactly built truck of the center control fork type, model "F-16," is illustrated here. Rated at 6,000 lbs. capacity, this is a companion type for a similarly rated truck having rear end control manufactured by the same firm.



"F-16" is built either as a telescoping or non-telescoping truck for inside car work or high tiering of pallet loads in warehouse. It may be fitted with a fork of 2 prongs to be thrust beneath metal or wood load carrying pallets or with a single or double ram for insertion in coils or circular ring type packages or unit loads. Forks and rams are made of various lengths and spacings to accommodate loads.

Operator's station amid-ship affords him unobstructed vision of the fork tips when load is being picked up or placed, and contributes more to his safety without increasing the important turning radius.

New type of trail or rear axle carries frame on a spring system which provides for a third-point support which assures floor contact not only for the 2 trail wheels but for the 2 drive wheels ahead and simultaneously provides against and from strains.

Fork hoist is fitted with slip clutch for protection against excessive overloads or accidental thrust of load forks under immovable loads, while an overrun ratchet device protects hoist and chains if load forks are lowered against obstruction. In addition an electro-mechanical brake holds the load at will of operator.

The "F-16" truck is of compact design and has perfect balance, yet all parts are readily accessible.

New Acid Resisting Bearings QC 29

Bearings and rollers of non-metallic materials are being manufactured by a well-known equipment designer. These accessories, molded from chemically inert substances, have proved most satisfactory in pickling tanks for steel and nonferrous metals, and have been successfully used on agitators in mash tanks and steam cookers of distilleries and breweries, according to the maker. These bearings have also found use in the paper industry and in numerous chemical installations.

Unique feature of these rotating parts is that they require little or no lubrication. Manufacturer claims that the corrosive fluids alone serve as suitable protection against mechanical friction. Parts are precision-molded in a wide range of shapes and sizes.

Chemical Industries
522 Fifth Ave., N. Y. City.

I would like to receive more detailed information on the following equipment: (Kindly check those desired.)

QC 25 **QC 28**
" 26 **" 29**
" 27

Name ....
Title .... **Company** ....
Address

New Chemicals for Industry

A digest of products and processes

Textile Manufacturers are Becoming "*Waterproofing Conscious*"

By Harold A. Levey

Consulting Chemical Engineer

THE public is fast becoming educated to the term "water-repellent." Textile manufacturers and even wide-awake commercial laundries are employing "waterproofing" as a sales appeal. Mr. Levey discloses several practical formulas which have been thoroughly laboratory tested.

PROCESSES for making our garments waterproof to varying degrees began with the wearing of clothes and the inability of finding natural materials which possessed this property along with the other desirable characteristics of our raiment. The obvious procedure would be to procure some workable material which is itself water resistant and coat the fabric with this type of product. In carrying out this procedure the fabric was invariably impregnated as well as coated with the waterproofing agent. This process substantially increased the weight of the fabric, usually filled most of its pores, stiffened it considerably, changed its insulating value in an undesirable way, and always produced a surface condition less desirable than the untreated material. As a result heavy sacrifice was always made to obtain waterproofness.

Natural oils, fats and waxes were the original substances used. They were melted, or heated to render them more fluid, and the fabric immersed in this liquid, the excess being removed in some convenient fashion. These products were applied to woven fabrics, hides, grasses, thin laminations of wood and bark, all of which made up our clothing and shelter. These conditions remained unchanged, except as to varieties, from the early days of the human race until the advent of chemistry as a science, and with it the production of new synthetic materials.

The water-insoluble metallic salts or soaps of the higher fatty acids were soon found to possess highly water resistant properties. It was found, therefore, to be desirable to form these soaps directly on the surface of the fabrics. The fabric was either first immersed in a solution of a water soluble soap such as sodium palmitate and then dipped in a water solution of a salt of the heavy metal such as aluminum acetate. A metathesis reaction or double decomposition took place forming aluminum palmitate on the surface of the fibres and water soluble sodium acetate which was washed away. As these insoluble metallic soaps are excellent water repellents, this process does a fairly good job. However, it is difficult to handle, and obtain a uniform deposition, though it is still practiced in the textile industry in some areas. Equivalent results are now more readily obtained by dissolving the metallic soap in a low priced volatile organic solvent which solution is sprayed onto the fabric, or the textile may be dipped into that solution. On evaporation of the solvent the metallic soap remains as a thin non-wettable surface film.

Many of these metallic soaps are soluble in certain oils, fats and waxes and such non-volatile solutions also find application today in the waterproofing of tents, awnings, tarpaulins, sails, and the like. This combination of two types of waterproofing agents makes for a product of a greater degree of waterproofness and longevity than either product alone. As previously pointed out, this process leaves much to be desired. Its stiffness, added weight, change of color, tackiness, especially when warm, are all undesirable properties and militate against its use for many applications.

The remarkable developments and improvements in the preparation of emulsions has opened up a type and method of waterproofing not heretofore available. This type of product very closely approaches the ideal objective of the waterproofing operation. These emulsions are of the "oil-in-water" type; however, a soft amorphous wax is used rather than an oil. This wax is so finely dispersed that the emulsion is in a class with milk. By this type of dispersion it is possible to have an emulsion on 50 per cent. or more of solids, while the emulsion even at this high concentration of solids is still quite fluid, comparing in viscosity with whipping cream. When textiles are tumbled in a diluted dispersion of this type in a standard laundry washing cylinder, the wax particles are finally deposited on the fibres of the textile much as butter is formed from milk. However, this deposition can be accelerated and a more uniform coating formed if the particles of wax are polarized or are electrically charged opposite to that of the textile fibres, and are thus attracted to them. This condition can be effected by the addition of suitable salts. Certain metallic salts contribute toward the waterproofing operation through their reactions with the emulsifying agent or protective colloid forming an insoluble water repellent metallic soap-like product. This is particularly true with aluminum, zinc and tin, and to a lesser degree with calcium, magnesium, barium and the like.

A representative formula of this type is made up of 30 parts of paraffin homogenized with a solution of 10 parts of glue and 5 parts of an emulsifying agent such as a sulfonated oil, or the sodium salt of an aromatic sulfonated acid in 50 parts of water. Ten parts of the emulsion so prepared are then heated to 40 to 50° C., and 1.5 parts of aluminum acetate on a dry basis are stirred into the emulsion. The product obtained forms a stable plastic mass when cold.

Methods of Operation

For use this solution is diluted with about 20 volumes of water and the textiles to be waterproofed are added. The operation is preferably conducted in a standard laundry washing cylinder at about 50 to 55° C. or somewhat above the melting point of the wax used. After 10 to 15 minutes of cylinder rotation the waterproofing operation is complete. The emulsion when initially placed in the washing cylinder was opaque white, much like milk. The liquor is now as clear and transparent as pure water. All of the wax has been taken up by the fibres. However, as the fibres are preferentially wetted by water, practically all of the wax is deposited as a very thin coating all around the outside of the fibres. This condition is ideal from many aspects. Only an exceedingly small amount of wax is required to produce the waterproofness desired, possibly from 1½ per cent. to 2½ per cent. of the weight of the textiles. Obviously this makes the process a most economical one as a hundred pounds of textiles can be waterproofed for a direct material cost of about 60 cents. In addition, because of the very small amount of wax used, the suppleness or texture of the fabric is actually improved. The surface appearance is semi-lustrous, cotton fabrics having the appearance of broadcloth. The garments so processed are substantially cooler, as the small projecting fibres are bound to the threads from which they emanate, thus make the fabric more porous and permitting the freer passage of air through the garment. In addition to being rainproof, they are stainproof. Perspiration under the arm does not stain the fabric of a jacket of a processed garment as would be the case with one not so processed. In summing up these properties it means that a wash suit may be worn possibly several times as long as would one not so processed. The suit hangs and drapes better, no starch is required, and because of the less frequent washings for the number of wearings, the life of the suit is materially increased.

Desirable for Commercial Laundries

From the standpoint of the commercial laundry, this process possesses the desirable aspect of the water repellent being washed out with each laundering operation. This necessitates the suit being returned to the commercial laundry for reprocessing, thus removing it from the realm of domestic operations, and to the advantage of the commercial laundry.

This waterproofing process ties in most effectively with the standard laundering operations. No additional equipment whatsoever is required for its use. Only one extra operation is required for its application. After the material has been washed in the cylinder and rinsed and drained, a dilute solution of the emulsion approximating 5 per cent. of the strength of the original formula given above is then poured into the washing machine, only a sufficient amount of liquid, made up of emulsion and water, to just cover the clothes. Obviously, the weight of the emulsion used must be from 4 per cent. to 6 per cent. of the dry weight of the suits to be laundered. Incidentally, the average linen garment closely approximates one pound dry weight, so that a man's wash suit made up of coat and pants averages two pounds. After twelve minutes of tumbling, the operation is completed, the water dumped, the clothes placed in the centrifugal dryer and then pressed in the usual manner. The heat resulting from the ironing or pressing fuses the minute particles of wax deposited on the outside of each fibre into a continuous coating film completing the waterproofing operation. As the cellulosic fibres are still preferentially wetted the water, all of the wax remains on the outside of the fibre where it is most effective in waterproofing. This condition also accounts for the efficiency of the process requiring a minimum of wax and producing a maximum of waterproofness.

In addition to the application of this process to wash suits, it is also desirable when applied to men's top shirts, washable cas, waiters and janitors' jackets, trained nurses' uniforms, and the like, as well as table cloths, drapes and similar goods. Naturally napkins, handkerchiefs, towels and the like would be rendered valueless for their particular applications, as their absorptive value would be almost nil.

This process is efficient because of the fineness of dispersion of the emulsion; and because it is of the "oil in water" type, it can be worked in the lowest priced solvent: water, and therefore reaches a new low cost of application. However, because of its composition it is unsuited for the dry cleaning process. Fabrics may be readily rendered water repellent in the dry cleaning process by dissolving in the solvent, be it a petroleum hydrocarbon mixture such as "Stoddard's Solvent" or the carbon tetrachloride-ethylene dichloride mixture or other dry-cleaning solvents, a waterproofing agent such as aluminum stearate, a wax or both. Low concentrations such as 1 per cent. to 3 per cent. are generally used.

Soft Non-Crystallizable Waxes Used

Usually soft non-crystallizable waxes are used and are frequently composed of a mixture of waxes whose flow point approximates 130° F. Otherwise the texture of the fabric will be undesirably affected. The waterproofing solution is applied after the garments have just been dry-cleaned. Before they are dried they are transferred from the cleaning solution into the waterproofing solution.

While commercial laundries prefer to have the waterproof properties wash out with each cleaning operation, certain groups prefer to have the waterproof characteristics of a more enduring value. These groups might include the suit makers and sellers and many of the suit owners. For such groups there have been developed waterproofing emulsions operating on a different principle. These compositions are made up of emulsions of solutions of cellulose derivatives such as cellulose acetate and ethyl cellulose in water-immiscible solvents stabilized by means of a protective colloid. Solutions of certain synthetic resins such as the polyvinyl esters, polystyrene and the like are also used. These emulsions are diluted and applied in a manner similar to the wax emulsions described above. Some of these resin coatings must be subjected to a moderate heat treatment to effect their condensation or polymerization to render them insoluble in the cleaning solvents.

There are now available some synthetic waxes and wax-like materials which are almost insoluble in the petroleum hydrocarbons used in dry-cleaning operations. These waxes are dissolved in a suitable solvent mixture and the garments immersed therein; the solvents are allowed to evaporate leaving a thin film of wax. Such types of waxes are emulsified in a manner similar to that previously described, the fabric being coated from a water bath. This method will produce a water repellent condition which will last from three to five washings. The temperature of the wash water and the activity of the detergent used in the cleansing operation determines the number of washings required to remove the waterproofing agent.

As a substantial amount of the emulsifying agent remains dissolved in the wax, this condition facilitates the removal of the wax. The presence of emulsifier tends to promote re-emulsification. This situation would prevail to a somewhat lesser degree were garments waterproofed with this emulsion, and then dry-cleaned.

Returning to the waterproofing effected with special waxes soluble only in a specific solvent mixture and insoluble in cleaners' naphtha; this process results in a greater longevity than the emulsion type, particularly in wet washing. These

methods, however, do not produce a waterproofing job comparing in length of useful life with the results obtained from cellulose derivative emulsions. The texture and draping characteristics of this type of waterproofing are not as satisfactory as when waxes are employed.

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New Processes

Pigments for Acetate Rayon

Titanium dioxide, when used as a delustrant for acetate silk, tends to lower the fastness of dyestuffs upon the material. Ellis and Stanley, in English Patent 501,805, describe the preparation of a finely-divided titanium dioxide whose aqueous suspension is treated with ammonium vanadate and formic acid. The dioxide is then separated, washed and dried, having taken up a small amount of vanadium compounds which act as a stabilizer for dyes which may later be applied to the titanium-delustred silk. Patent also refers to a direct process by which the dioxide-delustred silk is washed in hot aqueous ammonium vanadate containing the formic acid. (*Chemical Trade Journal*, June 9, '39, p. 549.)

Process for Surface Treatment with New "Dag"

New method for impregnating surfaces of parts subject to mechanical wear consists essentially of a chemical treatment creating a granular coating on the surface of the part, followed by dipping same into an oil suspension of an improved "dag" colloidal graphite. Granular surface structure is porous so that "dag" is carried well into the grain structure, forming a metallic bond with the metal. New suspension, created by Acheson Colloids, Port Huron, Mich., consists of particles less than 1 micron (0.001 mm.) in size and is said to make possible a truly impregnated surface of greater depth than heretofore.

Resins from Fish and Vegetable Oils

General methods for manufacturing resin-like compounds from the reaction products of maleic, or cinnamic, acid with oils such as linseed, cottonseed, sesame, olive, menhaden, sardine, and soya bean oils, are outlined in E. P. 500,348, abstracted in *Chemical Trade Journal*, May 26, '39, p. 507. Products range from viscous oils to hard, brittle resins, depending on the degree of unsaturation of the fatty ingredient, and the proportion of unsaturated acid used; the oil-like materials are quick-drying. In most cases, fat and acid are heated in the absence of air for a few hours. A number of these resins are nitrocellulose-compatible and yield a tough, flexible film with good adhesion to smooth surfaces.

New Products

Waterproof Dip for Lumber A penetrant varnish composition, said to be non-toxic, odorless and colorless, protects fresh wood (lumber and machined wood parts) against swelling and shrinking due to moisture. Liquid is applied by brush, spray or dip methods.

"Chromica" Paste Pigments Chromed oil paints having rust-inhibitive properties can be had from an English paint-maker. Chromium salts are dispersed in neutral oil, in an active form, by means of finely-divided (1,000-mesh) mica powder. It is reported that these new paints are successful as primers over metal surfaces.

Month's New Dyes Fastusol Blue LFFBL, a bright blue shade of reddish cast, is described as a color of good fastness to light and wear when applied to cotton, rayon, or pure silk. Diazo Brilliant Scarlet ROL Extra is a bright red almost of a coral tone, and is said to possess good all-round fastness and dischargeability on cotton and rayon.

"Zelljute" The Phrix-Arbeitsgemeinschaft, Hirschberg, Germany, exhibited at the Leipzig Fair a brownish synthetic fiber resembling jute. The material is to be produced in large quantities in the near future. "Zelljute" output for 1940 is expected to reach 12,000 tons, about 10% of the present jute demand.

Fertilizer From Peat A new fertilizer combination is reported to have been invented by 2 Soviet chemists, according to information received by the Chemical Division, Bureau of Foreign and Domestic Commerce. Mixture is said to contain air-dried, ground peat, ammonium sulfate, and ground phosphate rock. Advantages claimed for the new product are the ease and cheapness of its preparation, its tendency not to cake while in storage, and increased efficiency due to the slowness of the escape of the active ingredients into the soil.

Non-Staining Carbon Black R. T. Vanderbilt Co., N. Y. City, is marketing a soft carbon that is said to be practically free of oily impurities, and suitable for loading gasoline-resistant articles of rubber and the like. New product, "Thermax," is suitable for loading white rubber tire stock, it is claimed, because of its freedom from bleeding. Mixed with a little carbon black for deeper color, "Thermax" is recommended for loading black footwear.

Brilliant Bake Enamel Colors resembling brass, steel, aluminum, and other metallic lustres may be reproduced on any polished metal surface by applying a new kind of bake enamel. Coating is claimed by the manufacturer to be flexible, durable, and resistant to the action of plating baths.

Chemical Specialties for Industry

A digest of new uses and new compounds

Improved Formulation of UPHOLSTERY CLEANERS

By Dr. Charles F. Mason

A well-known authority on household chemical specialties suggests the introduction of new formulas which will assure manufacturers of a superior product.

THE word upholstery conveys to the average person the thought of cushions permanently attached to furniture, but the dictionary meaning is broader and includes interior fittings like hangings, cushions, curtains and coverings. It is obvious, that cushions alone comprise a wide variety of materials ranging from smooth leather through different varieties of plush to silks and satins, while tapestries and sun shades consist of natural silks and at least two varieties of synthetic silks or more commonly known as rayons.

In the absence of special products for cleaning upholstery, it is likely that removable tapestries have been and will continue to be washed with soap and water in the laundry and dried under tension to avoid warping. This leaves non-removable upholsteries—cushions and shades not easily adaptable to laundry washing—for the special composition. To date it is likely that dry cleaner's fluids have been used exclusively.

Shades and attached cushions, especially the latter, present a special problem in that they are neglected in daily routine cleaning operations and perhaps once a year a frantic effort is made to remove an accumulation and brighten coverings, which vary widely in material and are stained with many substances.

Professional upholstery cleaners usually beat a plush fabric with canes, while a vacuum cleaner sucks out the dust and loose particles; this operation is followed by rubbing with rags soaked in dry-cleaner's fluids and after evaporation a careful examination is made for difficultly removable spots like ink, chewing gum, foods, etc. At this point a careful selection of special cleaners to remove spots and not harm the fabric is necessary.

Ink and rust can usually be removed by a three per cent. solution of sodium oxalate in cold water or a six per cent. solution in hot water. Soaps, which liberate free oxygen when used in two to four per cent. solutions with water are serviceable for stains caused by coffee, wine, milk, cocoa and foods, which have water-soluble constituents. Many powdered soaps containing sodium perborate are available under various trade names. Some ink spots do not yield to one type of solution and may yield to another. Two of these are sodium phosphate dissolved in a two per cent. soap solution and sodium phosphate mixed with a solution containing active chlorine like Javelle water.

However, producers and merchants desire one product which contains all the reagents mentioned in preceding paragraphs and are willing to advertise that the product removes all spots, brightens the appearance without harm to any material. Although such a product is possible, it would be a dangerous one to place in the hands of a careless public, who think that they are paying for results with speed and no possibility of damage.

Washing Effect of Unfilled Soaps

To date there is no unity of opinion upon what constituents of soap while in solution have the washing effect. Chevreul and Berzelius attributed it to sodium hydroxide and an acid sodium salt of the fatty acid formed by hydrolysis. Other investigators like Rotundi, Kolbe and Knapp had slightly different views, which were distinctly chemical combined with one physical property—that of penetrating power.

It remained for more recent investigators to obtain data upon the physical properties of soap solutions and Hermann attributed the washing effect to the wetting out property; that if particles are wet by the solution they become dispersed or deflocculated and rise to the surface or are separated from the fabric, to which they are attached and are removed in rinsing. This wetting out property depends upon the chemical constituents, surface tension, foam, emulsifying and adsorptive properties. Data upon these separate properties are rapidly accumulating and sodium salts of some fatty acids have been found superior to the same salts of other acids but none are quite equal to the salts of sulfonated higher alcohols. These are now being added in small quantities to soap powders; their cost to date being too high for general sale in concentrated form.

Present views are that foaming is a swelling, the force of which exceeds the surface tension when lessened by soap in water. It is known that potassium soaps foam better and are

more soluble than sodium soaps; also, that soaps of unsaturated fatty acids dissolve to clear solutions at room temperature. Soaps of cocoanut, palm oil and sunflower oils foam better than those of tallow, stearin, and hardened oils of the drying or half drying type.

Schukoff and Schesta have proven that with any soap 0.20 per cent. to 0.40 per cent. dissolved in water is the best range of concentration for cleaning. Moreover, a one per cent. solution of soap containing one-fourth of one per cent. free fatty acid is superior to a two per cent. solution containing one-eighth of one per cent. of the same constituent. So although both solutions contain one-fourth part of free fatty acid per hundred parts one is superior to the other, from which the conclusion is drawn, that it is the ratio of this to total soap that is the controlling factor.

Deflocculation and Solution

With these facts in mind and assuming that the upholstery has been beaten and cleaned with the vacuum cleaner, the task of the liquid-form cleaner is to disperse or deflocculate the aggregates of foreign material so that with the aid of mechanical rubbing they can lodge in the wall of a soap bubble and be transferred to a clean wiping towel in a subsequent operation.

This is not difficult with dust particles and other easily removable solids but is nearly impossible with tenaciously adhering grease and oil spots. Here a solvent action is necessary and a dry cleaning liquid emulsified into the soap solution would occupy its proportional part in the wall of each soap bubble and, although some water would be displaced, the cleaning power of the product would be increased for many types of spots. Suggested formulae for some of this type are submitted.

Suggested Products:

1. Soap (Cocoanut Oil) (0.25% unsaponified)	1
Carbon Tetrachloride	32
Water	67

This product will not be a stable emulsion as the carbon tetrachloride will settle to the bottom upon long standing but the agitation of opening the can and of pouring will redisperse it and the usual precaution of "Shake well before using" is not necessary. The foaming power is not reduced by the presence of this non-inflammable solvent.

2. Naphtha (V. M. P.)	44
Oleic acid	4
Tri-ethanolamine	1.5
Water	48
Soap	1.5
Di-chloro-salicylic acid	1.0

The presence of the last constituent is for moth-proofing purposes and it is strange that to date no one has introduced such insecticides into these products. The soap is one consisting of 80 per cent. cocoanut oil soap and 20 per cent. sodium stearate with 0.25 per cent. free fatty acid in each. (Free fatty acid is based upon the total present.) The naphtha and oleic acid are mixed in one container and the other components in a second container. The oil solution is now poured into the water solution with vigorous agitation and the product is ready for packaging.

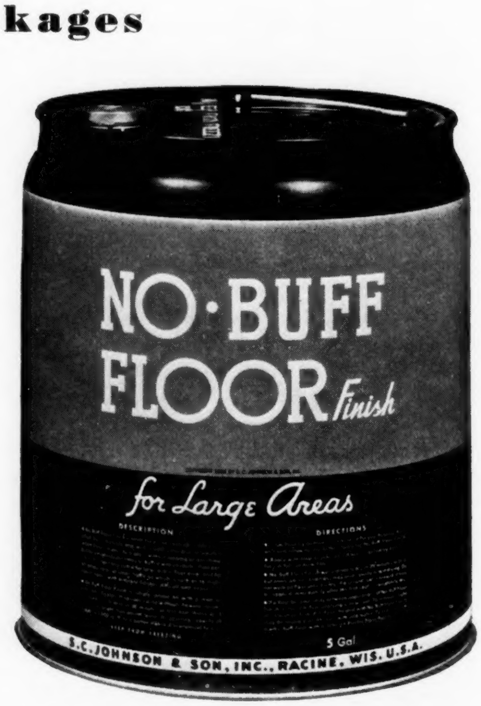
A gasoline jelly was patented in 1919 for this purpose but did not meet with success. It consisted of

Castile soap	1
Gasoline	95
Water	4

Obviously this was a viscous water in oil emulsion, which had too great a penetrating power in proportion to the foam produced. However, the formulator was thinking in the same channels as those of today; that is to have a product which will stay upon the surface. For a time there was some activity in formulating nap raising solutions for clothing, rugs, and upholstery, but they have not been adopted widely. They were water solutions of magnesium salts or borax and in one case copper sulfate. The idea was to stiffen the fibers by depositing salts in them which became rigid after evaporation. However, the principle was wrong and the public failed to buy.

New Products—New Packages

Anco Glass Cleaner has been developed by The Anderson Co., Gary, Ind., for use on automobile windshields and windows. A handy pad applicator which has a coarse side for removing insects and other stubborn deposits is included with each unit.



Johnson's No-Buff Floor Finish is a new offering of S. C. Johnson & Son, Inc., Racine, Wis. No rubbing or polishing is necessary, a high lustre developing as the product dries.

The P. D. George Co., St. Louis, has dressed up the container for its Pedigree Overprint Varnish by replacing the original labeled pail with a colorful lithographed one. A new lock-lever type of closure affords protection for the product when not in use.

The Importance of Oxidation Inhibitors

By Benjamin Levitt

DETERIORATION of a great many products through oxidation can be eliminated through the use of certain antioxidants, and loss of prestige of products prevented.

ONE of the major problems in industry is the control of the deleterious effects of oxidation. Everyone is aware of the spoilage of foods such as oils, fats, meat, potato chips, peanuts, candy and coffee. Organic coloring matter, petroleum oils, gasolene and rubber are other materials which deteriorate through oxidation.

Heat, air, light and moisture favor oxidation, and this effect is sometimes accompanied by rancidity. Enzymes from seed pulp and fat tissue, bacteria and various micro-organisms are also responsible for rancidity. This phenomenon is also hastened by the presence of metallic catalysts such as copper and iron.

It is now well recognized that unsaturated compounds yield more readily to oxidation than do the saturated. For instance, tung and linseed oils, both of which contain highly unsaturated glycerides, are the best oxidizing oils, and for that reason are used in paint and varnish where oxidation and drying is necessary. On the other hand, cocoanut oil and tallow do not readily oxidize. These two fats form the basis of most of the toilet soap. This soap remains white for a long period.

Not only do oils and fats oxidize and become rancid and discolored, but the effects are transmitted even after saponification, so that oxidative influences must be guarded against even in soap.

In this connection we cite an article[1] published elsewhere by the author. The effects of oxidation on a soap containing corn oil are described. Spotting was completely prevented for several years by means of R. T. Vanderbilt Co. antioxidant No. 16. This proprietary to be used must be dissolved in the oil to the extent of 0.25 per cent., prior to saponification. We have since found a number of other proprietary compounds which are equally good.

Free Fatty Acids and Rancidity

Although in most cases of rancidity, the free fatty acids parallel the degree of rancidity, the fact that an oil is rancid does not always mean that the free fatty acids are high. A rancid fat results from changes which have taken place, that give rise to odorous substances. The products formed as a result of rancidity are mixtures of aldehydes, ketones, lactones, oxy- and hydroxy fatty acids, alcohols, carbon dioxide and moisture. Such products have been isolated as azelaic acid, azelaic, pelargonic, and heptylic aldehydes, and acetic to nonylic acids and their aldehydes, according to Jamieson in his book—"Vegetable Fats and Oils."

One of the best known tests for rancidity is the Kreis Test. It is performed as follows: Five cc. are taken of the oil, together with five cc. C.P. hydrochloric acid (free from nitrosyl chloride), in a test tube. Stopper and shake well for 30 seconds. Five cc. 0.1 per cent, phloroglucinol in ether solution are added. Shake again for 30 seconds, and allow the mixture to stand for 10 minutes. A good pink color appearing in the lower acid layer indicates rancidity. Pale orange, yellow, or slight pink should be disregarded. If pink, a mixture of one part sample is made with nine parts of liquid petrolatum, and another mixture of one part sample with 19 parts liquid petrolatum. Test both mixtures as before.

As the Kreis reaction is such a sensitive test, Jamieson interprets the results by placing the oils and fats into four categories. 1. Those giving no reaction. These will withstand severe exposure before turning rancid. 2. Those giving a reaction when undiluted, represent products which have not turned rancid as far as odor and taste are concerned, but in which changes are already in progress which will later result in rancidity. 3. Those which give a reaction when diluted 1:10, but none in 1:20, represent a late stage of incipient rancidity, generally evident by bad taste and smell. 4. Those which give a reaction 1:20, show definite rancidity. Exception is made by Jamieson, in the case of crude cottonseed oil which gives a definite Kreis reaction, although free from rancidity.

Antioxidants for Food

Many compounds have been patented, which delay the effects of oxidation. While antioxidants or inhibitors used in industrial products are of great variety, those to be used in foods must be odorless and tasteless, they must not produce undesirable colors, and lastly, they must be nontoxic.

The following are some of the materials used, and their application to foods: Fish fillets treated with oat flour were less changed during cold storage for seven months, by oxidative and enzymic decomposition, than similar fish not so treated.

The addition of 1 per cent. of oat flour retards development of tallowiness or oxidized flavor in butter. This may be added as an aqueous filtrate from oat flour to the cream, after neutralization, and before pasteurizing.

Parchment paper treated with an oat flour extract is used for wrapping print butter in order to prevent surface oxidation.

A hexane extract of oat flour is used to the extent of 0.5 per cent. in crackers, or it is sprayed on the surface after baking, to prolong the storage life of crackers. For oleomargarine, mayonnaise, salad dressings, chocolate, candies and baked foods, the antioxidant properties of lecithin are helpful.

Orange juice is stabilized against rancid flavor when exposed to air during processing, even when heat treated in canning. U. S. Patent No. 2,148,593 specifies the use of one part apricot sirup to two parts of fresh orange juice. The beverage has good color and is superior in flavor to either the fresh orange juice or the apricot sirup.

U. S. Patent No. 2,147,261 covers the stabilization of the normal color in fresh meats and of the desirable pink color in cured meats, by the use of reducing sugars, such as dextrose, maltose, levulose, lactose, and invert sugar preferably dextrose. Mannitol triacetonate is recommended by its manufacturers as a potential antioxidant and color stabilizer for vegetable oils.

According to B.P. 492,714, vegetable and essential oils, fats, organic coloring matter are preserved against oxidation by incorporating therein, moderately roasted cacao bean or roasted cacao bean shells, so as to enable the materials to absorb antioxidants. A water soluble extract may first be made of the bean shells and then the extract may be added.

New Specialties

So far as preservatives in food are concerned, the only ones thus far permitted by the F.D.A. are the benzoates and sulfur dioxide. These probably do not function as antioxidants, but in most cases preserve the food against micro-organisms.

Technical Antioxidants

The antioxidants which may be used for technical purposes are very numerous. The following illustrations will serve:

U. S. Patent No. 2,020,496, concerns the prevention of premature oxidation of sulfur, carbazole and vat dyes so as to prevent side-shading.

B.P. 470,636 describes the use of phenolic aralkyl amino alcohols to stabilize oils or rubber.

U.S.P. 2,144,446 describes the use of 0.5 per cent. to 5 per cent. of allyl-b-naphthylamine for rubber.

U.S.P. 2,144,590 covers the use of 1 per cent. of 5-phenylamino-3-methylphenylene-thiazothionium hydroxide.

U.S.P. 2,101,241 describes a product obtained from chlorinated paraffin wax and oleic acid by reaction with anhydrous aluminum chloride. This is then treated with lime and the product derived therefrom, upon distillation is suitable as an antioxidant for lubricating oils.

B.P. 470,573 describes the use of sugaramines or salts thereof, to stabilize edible animal, fish oils and vegetable oils, against rancidity.

U.S.P. 2,103,188 covers antioxidants for rubber, fatty oils, cracked gasolene, synthetic plastics by the addition of 0.005 per cent. or more of bis-(p. anilino phenoxy)methane or substitution products thereof.

Hung. 117,082. Antioxidants such as dibenzyl p.aminophenol, etc., are suitable for addition to blown olive and cottonseed oils.

Brit. 475,259 describes antioxidants for rosin size, such as diphenylamine, tetramethyl diamino diphenylmethane and other complex amino compounds.

French 823,581 covers the addition of an alkylphenol, thiophenol and phenol sulfides and bisulfides, to increase the stability to heat of polymerized compounds such as those from isobutylene, styrene and indene.

B.P. 480,885 describes antioxidants for use in high vacuum distillation of oils, fats and waxes containing easily oxidizable matter. Hydroquinone, pyrogallol, furfurol, pyrocatechol and many others. It further specifies the use of compounds which have a volatility approximating that of the distillate.

Textile oils containing unsaturated compounds are made less liable to oxidation by heating with sulfur, to such a temperature as not to darken the oil, and which when cold does not stain metals, and contains less than 1 per cent. of sulfur. This is covered by B.P. 497,574.

There are hundreds of such patents covering the use of complex organic compounds. In most cases, those having a definite problem of decomposition of a product due to oxidation, will do well to apply to those firms who manufacture antioxidants and who have made a study of their uses for each particular purpose.

[1] B. Levitt—Oxidation of Soap and Its Practical Prevention—Indian Soap Journal Mar. 1936.
Jamieson—Vegetable Fats and Oils.
Smith & Wood—Industrial & Engineering Chemistry. 1926, pp. 691-694.
Klemgard—Lubricating Greases.
R. G. Harry, Manufacturing Perfumer—Mar. 1938, p. 82-85.

"Ruglyde" Rubber Lubricant New penetrating lubricating compound, product of American Grease Stick Co., Muskegon, Mich., contains "dag" colloidal graphite blended with pressure-saponified Babassu oil, and permanently wetted by glycerol compounds which also act as stabilizers. "Ruglyde" is non-corrosive to metals and their coatings, and improves the qualities of all types of rubber sponge, and rubber parts designed for automobiles, claims the manufacturer.

Chlorine-Proof Paint Recommended for the protection of steel from the corrosive action of chlorine gas is a formula including 50% pigment, 25% crude lignite bitumen, and 25% novolac or acrolite resin.

"Flectol H" One of the best-known producers of chemicals for the rubber industry has perfected a rubber antioxidant which is said to minimize discoloration effects to a marked degree. In addition, it is reported that this chemical has a very light color and possesses a low apparent density.

"Tire Black" Among the new chemical specialties is a black rubber dressing for restoring the original color to auto tires, rubber mats and running boards. Product can be readily applied with a sponge or damp cloth.

Radiator Rust Solvent An acid-type cleaner that dissolves rust in automobile cooling systems is said to differ from other radiator cleaners in that it both loosens and dissolves completely the rust particles. This specialty is sold in a two-compartment container, one section holding cleanser, the other a neutralizer to be added after cleaning and flushing the radiator.

Improved Filter Press Paper Filter cloths may be protected, and their efficiency greatly increased, by supplementing them with a filter sheet of paper. Manufacturer claims that product has a wet breaking strength almost as high as its dry breaking strength. Papers, furnished in reams of 500 sheets, are had for a trifling cost per sheet and are used to protect the filter screen, or cloth, from clogging. The paper medium is said to retain practically the whole of the precipitated matter.

Zinc Chromate Primer Undercoating primer for all kinds of metal work on which oil-base or synthetic paints are to be spread, has been placed on the market this summer. It is claimed that this zinc chromate primer can be applied by brushing, spraying, or dipping.

Quick Chemical Cleaner A quick-acting metal cleanser for most of the non-ferrous metals (aluminum and zinc excepted) requires no rubbing and contains neither polish nor abrasives, according to the manufacturer. Grease, stains and tarnish are said to be removed instantly by this novel chemical detergent, which is effective on copper, brasses and bronzes, and the like.

"H. T. A." Wood Finish A new wood finish is said to do away with the necessity for 3 coats of paint on fresh woodwork, as one application of this lacquer is considered sufficient. It is applied by an apparatus that maintains a temperature just under 200 deg. F. at a spray gun nozzle. The work is then air-dried for about an hour at room temperature, and finally force-dried at 120-140 deg. F.

Metal Pickling Agent A detergent solvent for cleansing metal surfaces, combining the action of soap and water with the solvent performance of benzines, has been placed on the market. Solvent wash liquid is a phenolic-type "Gunk," leaving on metal parts (e.g., dies, castings, stampings) a thin film of rust-preventing, resin-like material. Compound is claimed to be water-white, highly penetrative, and non-flammable.

Tough Rack Coating This rack coating is claimed to be a non-blistering and highly resistant dip for plating racks. Coating is white and has excellent covering power, it is said. Racks are treated with the material simply by dipping, followed by force-drying for an hour at about 200 deg. F. after each immersion. Application of 10 coats is recommended by the manufacturer.

New Trade Marks of the Month

InK-Out
367,903

MILLER
367921

VAPERFUMED
368,165

SCHOTT
376,161

Jena Glass
378,962-3

Alba
Gurkendoktor
GEHRING & NEIWEISER BIELEFELD
403,817

FRO-DEX
404,393

FERRY'S
405,353

Drayndri
368,391

NEVERMOTH
406,298

Safe • • way
411,189

PENN-O-TEX
412,389

LES HESPÉRIDÉES
412,760

TRAFFIC-COTE
415,121

Para-Baco
415,304

Para-Baco
415,305

BLUE RIBBON
415,386

L.P.H.
415,776

Selitrol
415,868

EDCAN
415,965

Pliacote
416,168

PORCELLO
416,173

COMMODORE
416,214

100%
416,586

EEZ
416,607

Benedetto
416,661

Goodrich
416,953

PRO-TEX-SIL
416,978

INSUBESTOS
417,037

ANKORD FINISH
417,047

LEC
417,198

CEL-U-SEAL
417,330

Trade Mark Descriptions†

No. 367,903. Cardine Corp., Montclair, N. J.; Dec. 28, '37; for ink eradicators; use since Mar. 27, '34. Not subject to opposition.

No. 367,921. Miller Chemical & Fertilizer Corp., Baltimore, Md.; Mar. 18, '39; for insecticides and fungicides; use since Feb. 1, '38. Not subject to opposition.

No. 368,165. Tildesley Coal Co., Cincinnati, O.; Apr. 26, '38; for coal; use since Apr. 1, '38.

No. 376,161. Jenaer Glaswerk Schott & Gen., Jena, Germany; Mar. 19, '36; for chemical glassware; use since about 1907.

Nos. 378,962-3. Jenaer Glaswerk Schott & Gen., Jena, Germany; May 26, '36; for chemical glassware; use since about 1907.

No. 403,817. Gehring & Neiweiser, Bielefeld, Germany; Mar. 8, '38; for preparation for preserving victuals; use since May, '34. Issued as of May 16, '39.

No. 404,393. American Maize-Products Co., N. Y. City; Mar. 23, '38; for cereal sugars produced from corn; use since Feb. 26, '38.

No. 405,353. Ferry-Morse Seed Co., Detroit, Mich.; Apr. 16, '38; for insecticide, particularly a garden spray; use since Mar., '38.

No. 368,391. Myron Winters, N. Y. City; Mar. 6, '39; for a mixture of chemical detergents for cleaning glasses and dishes; use since Apr. 13, '38. Not subject to opposition.

No. 406,298. Deborah C. Miner (Associated Chemists), Portland, Ore.; May 13, '38; for insecticides; use since Dec. 11, 1927.

No. 411,189. Southern Independent Oil and Refining Co., Inc., Evansville, Ind.; Oct. 1, '38; for gasoline, lubricating oils, and greases; use since Mar. 27, '38.

No. 412,389. Pen-O-Tex Oil Co., Minneapolis, Minn.; Nov. 4, '38; for gasoline, lubricating oils and greases, petroleum distillates—namely, fuel oils, furnace and range oils, pressure and fuel distillates; use since Feb. 11, '31.

No. 412,760. Etablissements Antoine Chiris, Compagnie des Produits Aromatiques Chimiques et Médicinaux, Soc. An., Paris; Nov. 15, '38; for essential oils for use in the production of perfumes and pharmaceutical articles; use since Apr. 4, '33.

No. 415,121. S. C. Johnson & Son, Inc., Racine, Wis.; Jan. 23, '39; for varnish; use since Apr. 26, '38.

Nos. 415,304-5. The Solvay Process Co., N. Y. City; Jan. 27, '39; for insecticides and fungicides; use since Dec. 6, '38.

No. 415,386. The Golden Rule Oil Co., Wichita, Kan.; Jan. 30, '39; for gasoline, kerosene, lubricating oils, and greases; use since Feb. 26, '34.

No. 415,776. Lucas Paul Hart, La Mesa, Calif.; Feb. 8, '39; for furniture and floor polish; use since Aug. 1, '37.

No. 415,868. De Trey Fréres S. A., Zurich, Switzerland; Feb. 7, '39; for dental materials—namely, synthetic resins, rubber, waxes, cement, and like artificial dentures for laboratory prosthetic work; use since Jan. 10, '39. Issued as of May 23, '39.

No. 415,965. Edward C. Sterling (Edcan Laboratories), Norwalk, Conn.; Feb. 11, '39; for alkyl halides, phosphorus halides, carbozones, organic arsines, and selenium compounds; use since Dec. 9, '38.

No. 416,168. Thompson-Hayward Chemical Co., Kansas City, Mo.; Feb. 17, '39; for pliable, flexible, chemical coating for barrels, storage tanks, tank cars, kegs, drums, etc., which waterproofs and renders them repellent to alkali, acids, and oxidizing agents; use since Dec. 1, '38.

No. 416,173. American Hair & Felt Co., Chicago, Ill.; Feb. 18, '39; for synthetic porcelain cement for filling (caulking) open spaces around bathtubs, wall and floor tile, and cementing or joining together of broken porcelain, marble, glass, or pottery articles, and the like; use since Feb. 6, '39.

No. 416,214. Tru Test Marketing & Merchandising Corp., Chicago, Ill.; Feb. 16, '39; for ready-mixed paint, paint enamel, and varnish; use since Jan. 10, '39.

No. 416,586. Scientific Plant Food Co., Miami, Fla.; Mar. 1, '39; for plant food and fertilizer; use since Nov. 3, '38.

No. 416,607. Willett Ward Hannan (The Eez Co.), Jamaica, N. Y.; Mar. 2, '39; for insecticide and parasite killer used for and applied exclusively to dogs and no other animals; use since Apr. 1, '37.

No. 416,661. Supreme Olive Oil Corp., San Fernando, Calif.; Mar. 3, '39; for soaps, namely, toilet soap, medicated soap, liquid soap, and soap chips; use since Feb. 24, '39.

No. 416,953. Walter H. Goodrich & Co., Inc., New Haven, Conn.; Mar. 11, '39; for gasoline, fuel oil, lubricating oil, and lubricating greases; use since Jan. 15, '31.

No. 416,978. Welmaid Mfg. Corp., Chicago, Ill.; Mar. 11, '39; for compound for polishing and retarding the tarnishing of silver; use since Mar. 11, '38. Issued as of May 16, '38.

No. 417,037. Union Asbestos & Rubber Co., Cicero, Ill.; Mar. 13, '39; for woven insulating blankets of amphibole insulating fibers utilized for insulating steam turbines and the like; use since Aug. 8, '34.

No. 417,047. Aqua-Sec Corp., N. Y. City; Mar. 14, '39; for chemical preparations for finishing, sizing, and otherwise processing textiles and textile fabrics; use since Feb., '39.

No. 417,198. American Lecithin Co., Cleveland, O.; Mar. 18, '39; for preparation for use in baking and bakery products, comprising a dry mixture of lecithin with cereal or leguminous flour; use since Nov. 1, '38.

No. 417,330. Covertex Co., Perth Amboy, N. J.; Mar. 21, '39; for adhesively coated transparent film-sheets; use since Jan. 2, '39.

† Trademarks reproduced and described cover those appearing in the *U. S. Patent Gazettes*, May 30—Class 12 et sequ.—to June 13, inclusive. See also next page.

Watson With Onyx

R. Allan Watson now represents Onyx Oil & Chemical Co., Jersey City, N. J., as sales and mill consultant. He will cover for the company West Virginia, Pennsylvania and other Middle Atlantic states.

Apothecaries Hall Co., Waterbury, Conn., is celebrating its 90th anniversary, having been in continuous operation since 1849.

New Trade Marks of the Month

ALBUMALT
417,367
RUSTCHROME
417,400
CLIPPER
417,424
HAR-TU-WET
417,457
SAV
417,609
KAR-FOAM
417,649
STAMINIZED
417,837
BERGONIZE
417,902

PEREX
417,919
UBK
417,920
PARICAL
417,963
SANTOMASK
418,017
NO-KRODE
418,049
Calsi-Ureor
418,051
Parapure
418,055
Salem
418,064

KLEENCO
418,082
BLUE Label
418,090
MIDEXPORT
418,257
WEEVIL DESTROYER-SMUT CONTROL-SCAB PREVENTION-CROW REPELLENT
Parsons SEED SAVER BRANDS SEEDTREATMENT
418,310
POTTSCO
418,369
Mi-Secret
418,404

TAPROSIZE
418,420
PERMAPAR
418,438
JAP-ROTE
418,497
B-C-A
418,590
O&R
418,611
STEAMIX
418,625
19/UP
418,626

EVER-BODY'S
418,659
TRI SOL
418,660
CEDACOTE
418,674
CAVALIER
418,774
HYGLIN
419,092
STEELBOND
418,980

(Trade Mark Descriptions Continued)

No. 417,367. Dehls & Stein, Inc., Newark, N. J.; Mar. 22, '39; for cereal extract for use in the brewing industry; use since Sept. 17, '37.

No. 417,400. Claronex Products, Inc., N. Y. City; Mar. 23, '39; for liquid to inhibit the rusting or corrosion of metals; use since Feb. 21, '39.

No. 417,424. Valley Sulphur Co., Lodi, Calif.; Mar. 23, '39; for dusting, burning, and soil sulfur; use since July, '37.

No. 417,457. The Hart Products Co., N. Y. City; Mar. 24, '39; for water-proofing compound for textiles; use since Jan. 5, '39.

No. 417,609. General Mills, Inc., Minneapolis, Minn.; Mar. 29, '39; for granular detergent cleanser for textiles, laundry use, and for general household cleaning; use since Mar. 24, '39.

No. 417,649. Karfoam Corp., Dover, Del., and N. Y. City; Mar. 30, '39; for automobile wash; use since Mar. 23, '39.

No. 417,837. Galena Oil Corp., Cincinnati, O.; Apr. 4, '39; for motor oils; use since Mar. 8, '39.

No. 417,902. The Bergonize Co., Chicago, Ill.; Apr. 6, '39; for water-soluble, transparent, protective wall coating for application over washable painted walls and washable wall papers; use since June 15, '38.

Nos. 417,919-20. E. J. Lavino and Co., Philadelphia, Pa.; Apr. 6, '39; for refractory bricks, plastics, and cements; use since Mar. 1, '39.

No. 417,963. General Chemical Co., N. Y. City; Apr. 7, '39; for insecticides; use since Mar. 8, '39.

No. 418,017. Synthetic Nitrogen Products Corp., N. Y. City; Apr. 8, '39; for fertilizers; use since Feb. 9, '39.

No. 418,049. Karl A. Milar (Milar & Co.), Chicago, Ill.; Apr. 10, '39; for metal primer; use since Aug. 27, '35.

No. 418,051. Monsanto Chemical Co., St. Louis, Mo.; Apr. 10, '39; for aromatic substances to be added to industrial products to improve the odor thereof; use since Feb. 4, '39.

No. 418,055. Paragon Oil Co., Inc., Brooklyn, N. Y.; Apr. 10, '39; for lubricating, motor, and marine, oils; use since June 22, '38.

No. 418,064. Salem Chemical & Supply Co., Salem, Mass.; Apr. 10, '39; for turpentine, wax polish, and oil polish for furniture and floors; use since 1893.

No. 418,082. Max Windschauer (Kleenco Boiler Products Co., N. Y. City); Apr. 10, '39; for chemical in powdered form used for cleaning steam boilers, steam mains and returns, automobile radiators, and the like; use since Mar. 1, '38.

No. 418,090. Blue Label Mfg. Co., Great Falls, Mont.; Apr. 11, '39; for furniture polish; use since Dec. 7, '38.

No. 418,257. Midcontinent Export Corp., N. Y. City; Apr. 14, '39; for lubricating oils and greases; use since Apr. 6, '39.

No. 418,310. Parsons Chemical Works, Grand Ledge, Mich.; Apr. 15, '39; for seed treating compounds, disinfectants, repellents, insecticides, germicides, and fungicides; use since '35.

No. 418,369. Sidney G. Simons (Carr Chemical Co.), Columbus, Ga.; Apr. 17, '39; for insecticide and vermin destroyer; use since Apr. 6, '39.

No. 418,404. Victor G. Bloede Co., Inc., Baltimore, Md.; Apr. 18, '39; for paper-sizing composition intended more especially for admixture with the papermaking stock, as in the beater engine; use since Apr. 12, '39.

No. 418,420. Refined Products Corp., Newark, N. J.; Apr. 18, '39; for chemical for treating textile materials; use since Sept. 12, '38.

No. 418,438. General Chemical Co., N. Y. City; Apr. 19, '39; for insecticides; use since Feb. 10, '39.

No. 418,497. Sherwin-Williams Co., Cleveland, O.; Apr. 20, '39; for insecticides and fungicides; use since Apr. 3, '39.

No. 418,590. O. & R. Products, Inc., N. Y. City; Apr. 22, '39; for paint and varnish remover; use since Apr. 12, '39.

No. 418,611. The Wait Associates, Inc., N. Y. City; Apr. 22, '39; for bituminous paving mixture; use since Feb. 17, '39.

No. 418,625. The Celotex Corp., Chicago, Ill.; Apr. 24, '39; for lightweight aggregate; use since Jan. 28, '39.

No. 418,626. The Celotex Co., Chicago, Ill.; Apr. 24, '39; for mineral-surfaced roll roofing and soft plastic cement comprising asphalt, and the like, as a base, and a thinner for sealing the roofing laps; use since Sept. 8, '38.

No. 418,659. Triplex Oil Refining Co., Inc., Long Island City, N. Y.; Apr. 24, '39; for motor lubricating oils; use since Mar. 25, '39.

No. 418,660. Triplex Oil Refining Co., Inc., Long Island City, N. Y.; Apr. 24, '39; for lubricating oils; use since Mar. 25, '39.

No. 418,674. Cedacote Products, Inc., N. Y. City; Apr. 25, '39; for preparations repelling moths and other insects that destroy clothing, furs, and the like; and for similar odorous disinfectants and insecticides; use since Sept. 15, '38.

No. 418,774. Frieden Bros. & Co., Inc. (Cavalier Laboratories), Norfolk, Va.; Apr. 27, '39; for household remedies and insecticides; use since Oct. 1, '35.

No. 419,092. Sylvania Industrial Corp., N. Y. City; May 4, '39; for cellulose ethers; use since Jan. 17, '39.

No. 418,980. Parker Rust Proof Co., Detroit, Mich.; May 2, '39; for chemicals for treating steel surfaces to obtain thereon corrosion-resistant paint-holding coatings; use since Apr. 20, '39.

Cheetam With A.C.P.

Tom Cheetam is now with American Chemical Paint Co., Ambler, Pa., as sales and engineering representative for the A. C. P. Wool Scouring Process. He was formerly with Procter and Gamble's Textile Division.

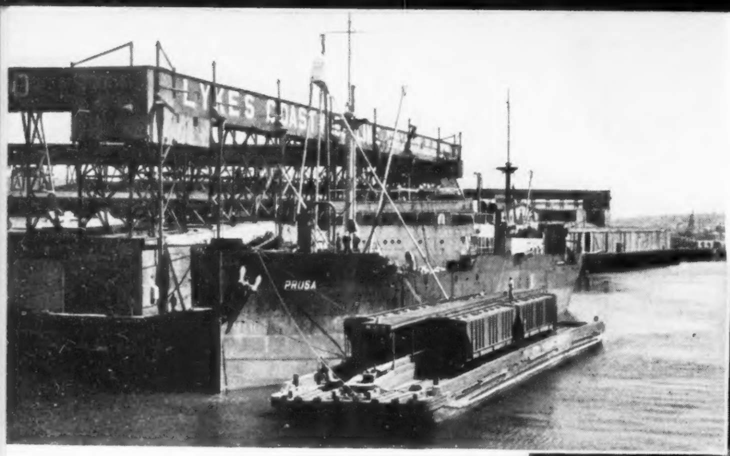
Bender Heads Clarkson

J. H. Bender has been elected president, Clarkson Chemical Co., Williamsport, Pa., succeeding the late W. H. Clarkson, founder. A. H. Hollenback is secretary and sales manager.

Highlights of the Rumford Chemical 80th Birthday Party

Center, President A. E. Marshall of Rumford, who acted as master of ceremonies; to the right, the "experiment" which opened the doors to Rumford Museum (below at the left). The museum was the company's first building and now houses a collection of early chemical equipment.

Count Rumford (impersonated by Theodore Sweet, company sales manager), returns to life and speaks at the dedication of his statue in the presence of a distinguished group of visitors. Below at the right, the modern Rumford baking powder plant.

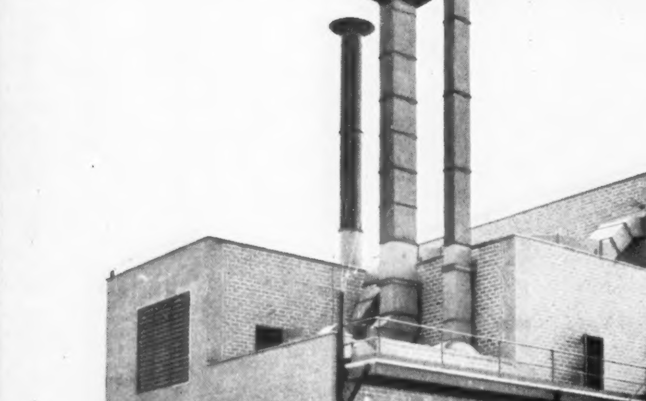


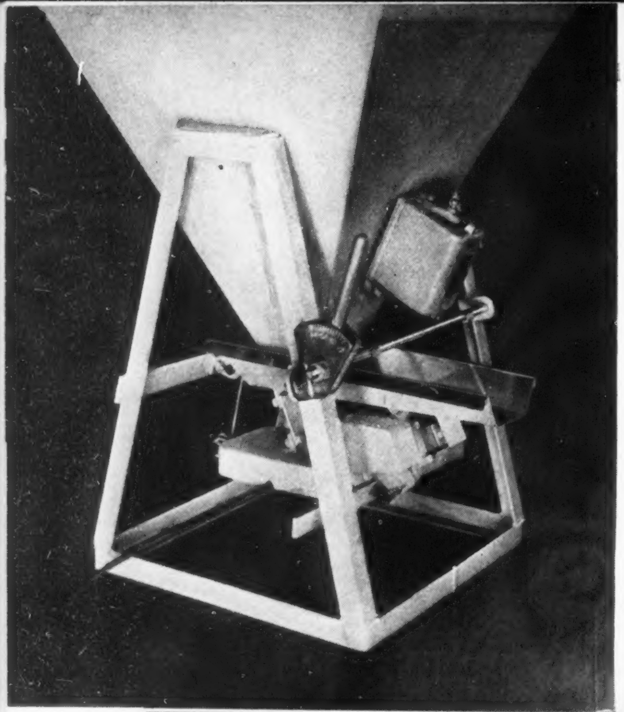
When the hatch cover was lifted, and at various stages of the unload ing, general amazement was expressed by witnesses that no carbo black dust or stain was in evidence.

Recently, the S. S. *Prusa* of the Lykes Coastwise Lines sailed from Corpus Christi, Tex., and shortly arrived at Boston, Mass., with a 150,000-pound cargo of Cabot's Spheron carbon black in her forward hold—the first bulk shipment of carbon black ever made by water. To the technicians and engineers of Godfrey L. Cabot, Inc., goes the credit for developing a unique method of successfully loading, unloading and transporting carbon black in cargo vessels. Representatives and officials of the largest rubber companies, as well as carbon black producers, were on hand to witness the unloading of the cargo by the Cabot Company's newly-developed apparatus.

Carbon Black By Sea

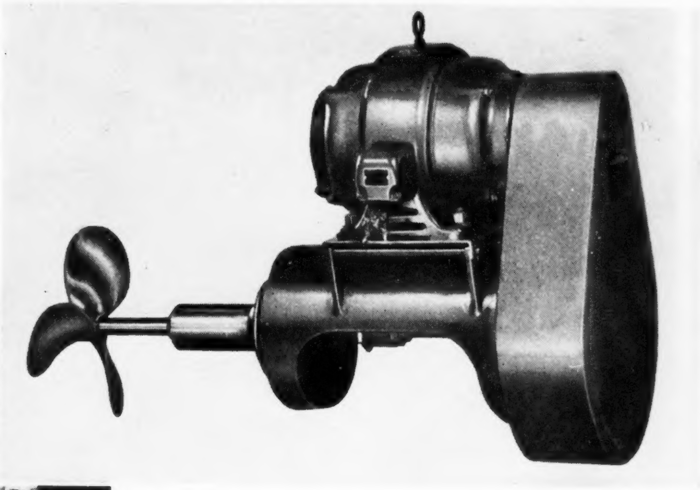
The Camera at Deepwater: New neoprene unit of Du Pont's which went into operation in the middle of July. The building is a four story tile structure covering an area of 9,500 sq. ft. and its addition to the neoprene plant will almost double present production capacity. The building is equipped with a ventilating system which removes impurities from the air before the air is drawn into the building. Left, rubber lined tank for use in storing hydrochloric acid—the Du Pont Dye Works Engineering Department rubber lines metal tanks. The above specimen was shipped from Deepwater, N. J., to the Baton Rouge Tetra Ethyl Lead Plant of the Du Pont Company. Right, rubber lined tank cars or trailers are used by the narrow gauge transportation system for handling acids. Similar type tank cars (not rubber lined) are used for transporting caustic.

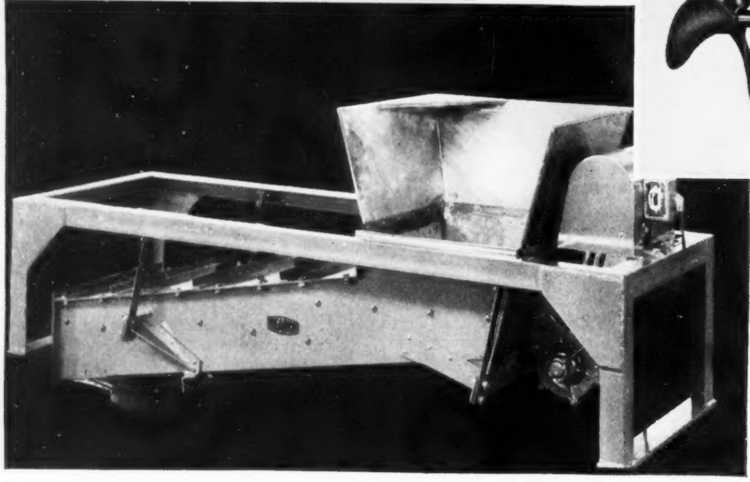




New in the Chemical Equipment Field

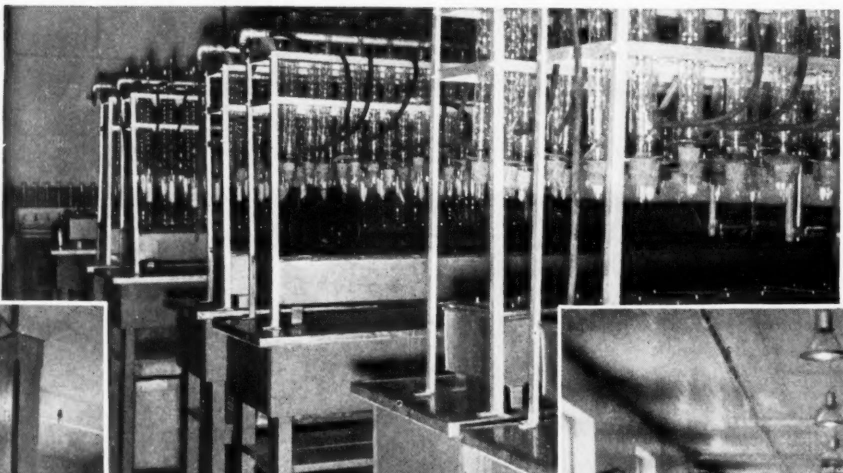
Left, a new, small model of dry feeder machine just added to its line of larger capacity vibratory dry feeder machines by the Syntron Co. Below, product of the continuous development policy of the Mixing Equipment Company, the newly redesigned "Lightnin" Side Entering Vee-Belt Mixer has many new features of interest to production executives in the process industries. In the redesigned model the motor is mounted on pivoted steel platform, actuated by a riser bolt, permitting maximum adjustment for belt tension or replacement of sealed outboard bearing.



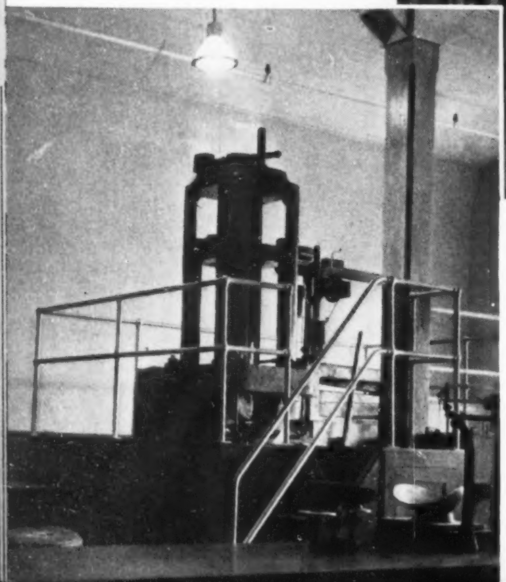


Readco's latest development is a Vibrating Screen Sifter for granular or pulverized material. A vibrating screen extending the full length and width of the sifter is operated from a standard motor with a guarded Vee-Belt drive to vibrating unit. Material is sifted to a polished vibrating discharge surface with outlet at one end. Tailings are deposited in a compartment conveniently located at floor level. No exposed moving parts and no sliding surfaces are used in the construction of this new Sifter. Read Machinery Co. is the maker.

In the Engineering department is an Olsen Universal Testing machine, with a full capacity of 200,000 pounds.

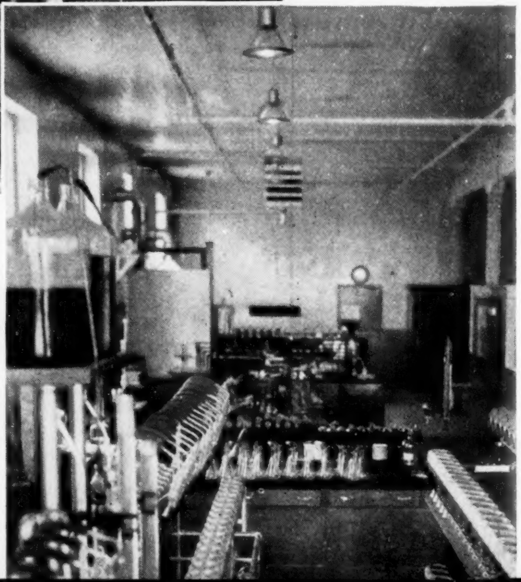


The oil extraction room (partial view shown at left). This department has ten steam tables.



New Southern Laboratory

Several hundred visitors recently inspected the new laboratories of the Barrow-Agee Laboratories at Memphis, Tenn., in celebration of the opening and 22nd anniversary of service to industry. The laboratory covers 12,000 ft. floor space, and is said to be the finest in the South. G. Worthen Agee is president and E. R. Barrow is secretary-treasurer, and founders of the laboratories. At right, a view of the main laboratories.



News Review of the Month

TNEC RELEASES PATENT REPORT

Preliminary Report Suggests Far-Reaching Recommendations for the Revision of the Patent and Anti-Trust Laws—Recommends Single Court of Patent Appeals—Would Limit Patents to 20 Years—Further Hearings Likely—

THE Temporary National Economic Committee, in its preliminary report made public July 16, submitted far-reaching recommendations for the revision of the patent and anti-trust laws. The proposed legislation, parts of which have already passed through Congress, includes fundamental changes in procedure whereby patent law litigation can be expedited, and contains provisions intended to prevent the use of patents as instruments in restraint of trade. The Departments of Commerce and of Justice, both of which are represented on the Committee, have been instrumental in effecting these two major reforms. Of these, the one dealing with the anti-trust aspects of the patent situation is undoubtedly the more rigorous.

For the handling of litigation the Department of Commerce recommends a single court of patent appeals having jurisdiction in the U. S. and its Territories. According to the Dept. of Commerce, such a court would reduce the time and cost of hearings and end the conflict of decisions between the various appellate tribunals. It has also been recommended that the life of a patent be limited to 20 years from the date of filing application—at the present time, it is of 17 years' duration from the date issue—in an attempt to prevent the prolonging of a "patent monopoly" by keeping the application on file with the Patent Office for an indefinite period of years. A plan simplifying the matter of interference procedure has also been proposed, providing for the quick disposition of cases. This plan allows but one decision by the examiner, said decision to be followed immediately by the granting of a patent according to the ruling in question; interference appeals within the Patent Office would thereby be obviated.

Policy On Renewals

Following up the simplification of Patent Office routine, renewal applications are to be abolished entirely. It is pointed out in the TNEC report that an applicant can, at present, prosecute his application to the point of allowance (i.e., to actual granting of a patent right) and, by failing to pay the required fee, then renew the application. Other steps included in the measures now being considered cover the shortening of the public use of an invention (i.e., prior to filing of application) from two years to one; further, the Commissioner of Patents is to be empowered to summon an applicant to respond to an Office action within less than the 6-month, normal interval allowed by law. Concensus of opinion of these proposed amendments to patent procedure is definitely in favor of the Dept. of Commerce's recommendations, which are certain to go into effect as soon as possible.

Patents and Trade Restrictions

The TNEC has also initiated proposals banning the use of patents for trade restrictions, measures sponsored by the Dept. of Justice. One of these states that it should be made unlawful for any person to sell or assign a patent on any condition tending to restrict the patentee or assignee in respect with the quantity of any article (or with the price or manner of use of said article) which he may produce under the patent. The further recommendation is included that the restrictions involved may not tend substantially to lessen competition or create a monopoly. These prohibitions are not designed to apply to assignments of patent rights to parties resident outside of the U. S. and its Territories. Another important provision is that which requires the filing with the Federal Trade Commission of a certificate of transfer of a patent grant, which document would be open to the inspection of designated officials. In the event that either of these proposed laws should be violated, the owner of the patent will forfeit his right (or interest) to that patent, which will become the property of the U. S. Government. Dept. of Justice would file civil suit against the individual in that case, according to the proposed measure.

The proposals offered by the Committee are designed to give the patentee full individual use and benefit of his invention but, upon his transferring license to the patent, said license will be required to be general and unrestricted—unless it can be shown that a particular restriction, other than one of price or production, is vital to the promotion of science and the useful arts.

Further Hearings Likely

Senator O'Mahoney, TNEC chairman, stated that the findings and recommendations of the Committee are to be supplemented by further conferences. In hearings held during the first half of this year, testimony was heard on the patent situation in the glass container, beryllium, and automobile industries. The glass container industry was cited by the Dept. of Justice as an illustration of restrictive methods employed in some industries where rigid control may be obtained through closely-held patents. The automobile industry was presented as an example of an industry where patents were freely exchanged for the general advancement of the industry on a competitive basis. Beryllium, an excellent example of a new and growing field, was studied by the members of the TNEC as representative of the importance of patent protection to a new organization.

News Index

Heavy Chemicals	189
Fine Chemicals	191
Solvents	192
Specialties	193
Coal-Tar Chemicals	195
Agricultural Chemicals	197
Fats & Oils	199
Raw Materials	199
Pigments, Fillers, etc.	200

A. C. S. To Boston

THE 98th Meeting of the American Chemical Society convenes Sept. 11-15 in Boston, Mass. Hotel Statler will serve as headquarters. The program's highlight will be a celebration of the centenary of Charles Goodyear's discovery of the vulcanization of rubber. About 5,000 are expected to attend the meetings of the various A. C. S. Divisions. Dr. James B. Conant, Harvard's president, and Nichols Medalist, is honorary chairman of the convention. Dr. Gustavus J. Esselen, president of the consulting firm, Gustavus J. Esselen, Inc., and a director of the Society, heads the convention committee of over 100 members.

The Goodyear anniversary will be formally observed in the afternoon and evening of Wednesday, Sept. 13. A forum on the progress of the rubber industry is scheduled for the afternoon session; among the speakers will be chief chemist E. B. Babcock, Firestone Tire and Rub-

The Final Report of the Mixed Committee of the League of Nations contains the following generalizations regarding vitamin B_1:

"It is noteworthy that physicians are reporting favorable response by many patients who suffer from poor appetite and neuritis following administration of this vitamin. This suggests that even in a country with ample food resources, faulty selection of food may result in this specific form of malnutrition. There is strong evidence that human dietaries in many parts of the world are more or less deficient in vitamin B_1, although beriberi is absent."

Probably the most extensive investigation ever undertaken to determine the adequacy of the American diet as a source of vitamins and other essential food values is that reported by Stiebeling and Phipard in circular No. 507 recently released by the U. S. Department of Agriculture. This study consists of a detailed survey of the diets of some 4000 typical American families distributed in 43 industrial centers in eight major geographical regions of the United States.

The following observations are significant:

1. **Approximately 10% of all the white families studied received less than the suggested minimum requirement of 300 International units of vitamin B_1 a requirement unit per day.**

2. **Approximately 50% of all the white families received less than 500 International units of vitamin B_1 per day, an amount which has been suggested as the daily allowance for moderately active adults.**

The foregoing figures are conservative, since they are based on foods *as purchased* and not as consumed. Because vitamin B_1 is water-soluble, a significant amount is lost when the water in which foods are cooked is discarded. Heat and alkali also are important destructive factors.

In a recent report, "A Clinical Evaluation of the Adequacy of Vitamin B_1 in the American Diet" (New International Clinics 4:46, 1938), Jolliffe points out that alterations of the American dietary to enhance the keeping qualities, the appeal to sight, smell, and taste, or the value in other accessory nutritional factors of various foods, have resulted in a displacement of vitamin B_1. He concludes that the modern American dietary contains only one-third of the vitamin B_1 present in the dietary of a century ago.

VITAMIN B_1 Merck Crystals

Pure Crystalline Vitamin B_1 Hydrochloride

(Potency 333 International Units per Milligram)

Offers a most effective means of correcting dietary deficiencies resulting from an insufficiency of this essential factor in the food supply.

Therapeutic Dose. To ensure curative dosage in advanced vitamin B_1 deficiency, from 5 to 100 mg. daily, equivalent to approximately 1665 to 33,300 International units, may be required. Later, the dosage may be reduced to 5-10 mg. (1665-3330 I. U.) daily.

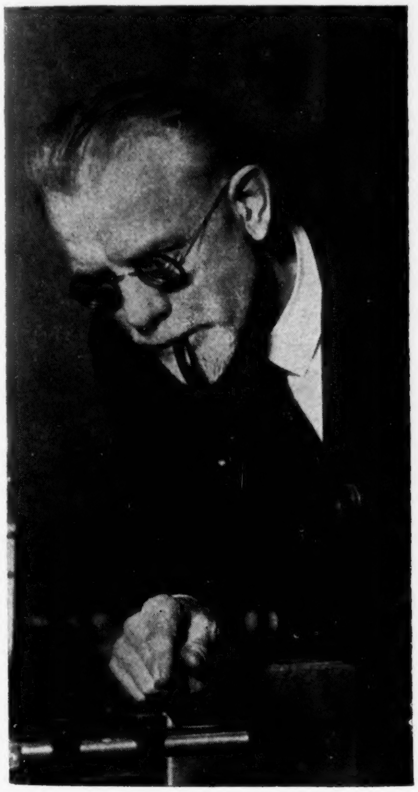
Important Indications. Anorexia of Dietary Origin . . . Beriberi . . . Alcoholic Polyneuritis . . . Essential for Optimal Growth of Infants and Children. May be administered orally or parenterally. Very soluble in water and slightly soluble in alcohol.

Literature on Request

MERCK & CO. Inc. *Manufacturing Chemists* RAHWAY, N. J.

NEW YORK • PHILADELPHIA • ST. LOUIS IN CANADA: MERCK & CO. LTD., MONTREAL & TORONTO

ber, Goodrich Rubber's executive vice-president, A. B. Newhall, and R. W. Lunn, managing director of the Leland and Birmingham Rubber Co. Mr. Lunn will review Goodyear's career in an address, "Work of Charles Goodyear." W.



DR. CHARLES A. KRAUS

Head of Brown's Chemistry Department and president of the A. C. S.

A. Gibbons, director of research, U. S. Rubber, will review "The Rubber Industry since 1839." At the evening banquet, Dr. Charles A. Kraus, A. C. S. president, will present the speakers, who include President W. S. Knudsen of General Motors, Dr. Karl T. Compton, president of M. I. T., and Dr. Conant.

The Rubber Chemistry Division of the Society will sponsor on the following day a Symposium on Vulcanization. The annual address by the president will be given by Dr. Kraus before a joint meeting on that same day, Sept. 14, at 2 P.M. M. I. T. will hold "open house" for the Society on that afternoon, when Prof. F. G. Keyes will present an experimental lecture on "Properties of Matter at Very Low Temperatures" in his "Tech." laboratory.

Du Pont Takes 150

New technical graduates, about 150 in all, from American schools will join the Du Pont organization during the summer. In addition, Du Pont has engaged 35 technical school men temporarily at its exhibits at the New York and San Francisco World's Fairs, and at Atlantic City. Some of the temporary men will probably be promoted to regular posts with the company. In rating candidates, points which the Personnel Division looked for included energy, command of English, initiative in conversation, aggressiveness, personality, poise and manner. Interviewers also sought answers to such questions as to whether the candidate seemed determined, and the degree of his interest in his chosen field.

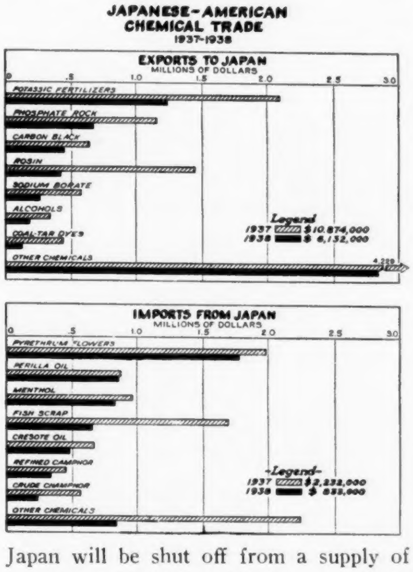
DCAT at Skytop Oct. 19

Drug, Chemical, and Allied Trades Section, N. Y. Board of Trade, will meet Oct. 19-21 (Thursday through Saturday) at Skytop, Pa. William D. Barry, Mallinckrodt, is the chairman of the section. Ralph Dorland, Dow Chemical, is in charge of general arrangements for the Autumn get-together.

Jap. Trade Treaty Cancelled

An examination of our chemical trade with Japan during the last 2 years reveals that both imports and exports fell off in 1938, as compared with the previous year. U. S. imports from Japan last year were valued at only $833,000, in contrast to the estimate of $2,232,000 for the shipments received in '37. Principal import items include pyrethrum flowers, fish scrap, and "other chemicals," according to the Dept. of Commerce.

Exports to Japan (principally fertilizers, rosin, carbon black, borax, and "other chemicals") in '38 totaled $6,132,000, as compared with the $10,874,000 estimated for these goods in the year before. The bar graph shows clearly the extent to which the chemical trade with Japan has declined. If the commercial treaty of 1911 is denounced next January,



Japan will be shut off from a supply of necessary chemical products, as well as from scrap metal and other essential war materials. The Congressional Committee on Foreign Affairs is considering the application of an embargo against Japan with respect to arms, ammunition, and many of the above-listed items.

Japan's Chemical Status

Operations of Japan's chemical industry during the current year have been carried on in the face of increasing difficulties arising from the emergency measures in effect since the outbreak of hostilities in China, according to reports from the American Commercial Attache in Tokyo, made public by the Commerce Department's Chemical Division.

Certain branches of the industry were operating at full capacity, particularly those furnishing chemicals to plants manufacturing munitions and allied products, but others were finding it increasingly difficult to obtain sufficient labor and raw materials due to official restrictions upon plants engaged in the production of non-military materials, the report states.

Chemical prices have risen steadily in the past two years, analysis reveals. In the first half of the current year industrial chemicals were being quoted at prices averaging 30% higher than in the corresponding months of 1937, and fertilizer prices have risen approximately 22%.

Japan's chemical and related product imports were down approximately 40% to $9,900,000 during the first 4 months of the year as compared with the 1938 period. This was due mainly to restrictions placed on imports of non-military materials, and partly to increased output along certain lines, it is reported.

Exports of chemicals and related products, on the other hand, increased 38% to a total valuation of $10,250,000 in the first 4 months of the current year, due almost entirely to heavier shipments to yen-bloc areas.

Although complete details regarding Japan's chemical exports during the current year are not available, official foreign trade returns of the country indicate that fully 70% of the total went to China, Kwantung Leased Territory, and Manchuria.

Employee Relations

Metropolitan Life, through its Policyholders Service Bureau, issued this summer a report, "More Information for Employees Regarding Their Company," supplementing a similar study made public about four months ago. The study endeavors to present for the benefit of employees annual reports of operations and earnings of their respective companies. An effort is made to simplify the terminology of finance, with which relatively few employees are familiar. This project disclosed the fact that increasing attention is being given to finding out what employees want to know about their company, before starting an educational program. Copies of these reports may be had from the company, One Madison ave., N. Y. City.

Heavy Chemicals

Contraseasonal Gain In Chemical Shipments

July Tonnages Ahead of June—Copper Sulfate Advanced When Metal Price Rises—Slight Drop in Tin Derivatives—Chlorine in Good Demand—Alkali Tonnage Encouraging—

A DECIDED improvement in the volume of shipments of industrial chemicals took place in the last half of July. Practically all producers and jobbers report that business recovered very appreciably from the low point reached in the first week of the month and that the usual seasonal recession has not been at all pronounced.

Certain of the more important seasonal items have been aided considerably by the exceptionally dry weather prevailing over most of the Eastern seaboard. Chlorine tonnages for water treatment purposes have been heavy and have helped to develop a firmer tone in that market. The use of calcium chloride for dust-laying is very encouraging and ahead of earlier expectations. The demand for refrigeration chemicals has been good.

Pick-Up in Volume

Conditions in most of the chemical consuming industries were better at the close of July than they were 30 days earlier. This was particularly so in the steel industry and shipments of sulfuric into that field reflected the fact that steel activity reached a new high for '39 in the middle of the month. Still further advances in the rate are expected, based on the fact that the automobile manufacturers placed but very little business in July and are expected to come in in August with large orders for immediate delivery. Plating chemicals were in better demand than was expected during July. Auto sales are showing a strong contraseasonal advance and, as a result, activity in the Detroit area has not slumped quite as sharply as normally takes place when new models are being made ready.

Activity in textiles, other than in silk, has been somewhat of a pleasant surprise. The tanners are busy also. The continued expansion in rayon has helped to move acetic in greater quantities and a slightly firmer price tone was in evidence in the item at the month-end. The favorable situation in rayon has, of course, been beneficial to the movement of caustic.

Price changes were relatively few and unimportant in the past 30 days. Some slight weakness developed in the tin market late in the month and this forced reductions of ½c each in sodium stannate, anhydrous stannous chloride, and tin crystals. No price change was made on the tetrachloride.

Copper, on the other hand, moved up, registering a ¼c rise. As a result of this, copper sulfate (crystal) was advanced 15c per 100 lbs. and in carlots is now quoted at $4.25. The monohydrated grade also is now priced higher, the increase amounting to 20c per 100 lbs. On the new basis, the carlot quotation for dealers is $8.65, f.o.b. works. The consumption of blue vitriol for agricultural purposes has been heavy, but the peak of the season is now just about past.

Important Price Changes

	July 31	June 30
ADVANCED		
Copper metal	$0.10¼	$0.10
Copper sulfate	4.25	4.10
monohydrated	8.65	8.45
DECLINED		
Barium hydrate	$0.04½	$0.04¾
Sodium stannate	.31½	.32
Stannous chloride	.45	.45½
Tin crystals	.37½	.38
Tin (Straits)	.4845	.49

A slightly lower price on barium hydrate was announced early in July. The decline amounted to ¼c and brought the carlot quotation to 4½-5c.

Based on the rather unexpected pick-up in July most factors are now rather hopeful that August will show a continuance of the contraseasonal trend in business activity. There appears to be a more definite feeling that no war will develop in August or September and part of the present up-turn reflects a more hopeful viewpoint on the foreign situation.

Personnel

J. T. Tierney, president, Koppers United Co., has been elected chairman of the executive committee of the board of trustees, to succeed C. D. Marshall, who has just resigned. Mr. Tierney will continue to serve both as president of Koppers United and as chairman of the Koppers Company board, but will relinquish the presidency of the latter. J. P. Williams, Jr., will serve as president of Koppers Company, replacing Mr. Tierney.

Fred Denig, vice president of Koppers' Engineering and Construction Division, has been appointed to the newly created post of director of research and development for all companies and divisions of the Koppers group, which includes Koppers Co. and Eastern Gas and Fuel Associates, their divisions and subsidiaries.

Benger Promoted

Dr. Ernest B. Benger, general assistant chemical director for Du Pont, has been appointed assistant manager of company's Rayon Department Technical Division, which has been reorganized to include the technical work of the Nylon Division. M. du Pont Lee continues as manager of the Rayon Department Technical Division.

Hercules' Changes

Dr. Emil Ott has been appointed director of research, Hercules Powder Co.; he will have headquarters at company's

DR. EMIL OTT
New Hercules Director of Research.

Wilmington office. Since 1937, Dr. Ott has been head of the research department at the Hercules Experiment Station. Mr. O. A. Pickett will continue as director of the Station.

George E. Ramer, chief engineer with Hercules Powder for over 20 years, has retired from active duty as of Aug. 1. He will be succeeded by L. H. Sperry, manager of company's chemical cotton plant at Hopewell, Va.

H. F. Kolb, director of purchases, Hercules Powder, has been transferred to company's San Francisco office. He will be associated with the Casein Dept. of the "PMC" Division. J. B. Johnson, of San Francisco, will succeed Mr. Kolb as director of purchases at Wilmington.

Kuehl With Foote

Frederick G. Kuehl has become a construction engineer with the Foote Mineral Co., Philadelphia. Graduate of Columbia School of Mines, '30, he was formerly working in South America.

"The Gangplank"

Fred O'Flaherty, director of University of Cincinnati's department of leather research, sailed Aug. 15 for a vacation in Europe.

H. H. Bass, chief technical officer, Pyrmont Distillery, a division of the Colonial Sugar Refining Co., Ltd., Sydney, Australia, is making a tour of West Indies rum distilleries. He will return in the *Lindvagen* Sept. 20, to New Orleans, and plans to sail from San Francisco Oct. 10 in the *Mariposa.*

Fine Chemicals

Agar and Santonin Reach Higher Price Levels

Quicksilver Turns Downward in Face of Light Demand—Mannitol Again Reduced—Natural Camphor Weak—Citric and Tartaric Acids in Good Volume—Menthol at $2.90—

SENSATIONAL advances in agar and santonin featured the July market for fine chemicals, pharmaceuticals, and aromatic chemicals. Spot demand for agar reached unexpected levels in the period under review and the available stocks were reported to be below normal. First hands were said to be unwilling to quote very far in the future because of the several uncertainties in the foreign situation, particularly in the Far East. Considerable purchasing of santonin by European countries was rumored about in trade circles and this was the reason given for the several sharp price advances in the last few weeks.

In the absence of any real sustained buying interest the market for quicksilver showed distinct evidence of price weakness. This was in contrast to the conditions prevailing a month or so ago. No appreciable weakness was apparent in the mercurials.

The price structure on natural camphor has declined somewhat from the June level. Japanese natural powdered material at the month-end was quoted at 47½c per lb. and slabs at 48c. Buying volume was somewhat below normal for this period of the year.

Another Decline In Mannitol

Quotations on pure reagent grade of mannitol were reduced 10c per lb. and the new basis is 95c-$1, according to quantity. The commercial grade, crystal form, is now 42c in ton lots, and 50c for smaller quantities. The use of this chemical is expanding rapidly and producers are employing the policy of passing along to consumers the benefits derived from greater economies in production costs. Such policy, of course, also inevitably leads to wider applications.

Other price revisions in the past month included a 2c advance in iron-ammonia citrate scales, ¼c decline in cocoa butter to a carlot price basis of 10¼c, and further reductions in silver nitrate forced by the upset market for silver bullion. In the final half of the month the item appeared to be stabilized at 26⅞c. The trade is now of a mind that the gyrations of the period following the action of Congress on silver purchases is over and greater price stability is more than likely.

The July volume of business placed in fine chemicals was encouraging. Seasonal items particularly were in good demand. The hot, dry weather which prevailed over most of the Eastern seaboard aided materially in the consumption of citric acid and tartaric acid, and both items displayed firm price tendencies. Shipments of alcohol for industrial purposes were slightly above normal for this period of the year.

Important Price Changes

	July 31	June 30
ADVANCED		
Agar, No. 1	$1.50	$1.25
Iron-ammonia citrate scales	.47	.45
Santonin, kilo	88.00	55.00
DECLINED		
Acid acetylsalicylic	$0.40	$0.50
Camphor, nat., powd.	.47½	.48½
slabs	.48	.48½
Cocoa butter	.10¼	.10½
Mannitol pure	.95	1.05
Menthol	2.90	2.95
Mercury, dom.	86.00	88.00
Silver nitrate	.26⅞	.28⅜

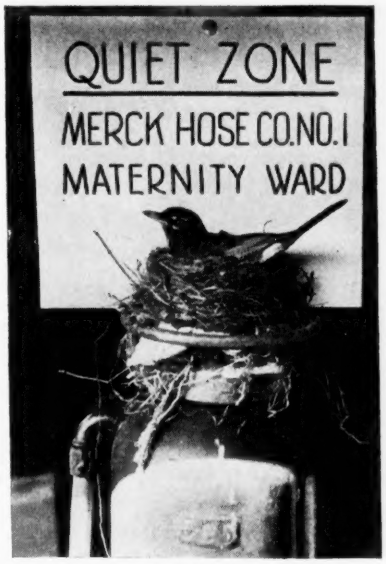
The market for essential oils and aromatic chemicals was quiet last month. Prices generally were firm and unchanged from earlier levels. Consumption was reported as being just about normal for the summer period.

Adds to "Frisco" Offices

Fritzsche Bros. has taken larger quarters for its San Francisco office, which is now at 729 Rialto Bldg. Stanley Crouch continues as Coast representative for the N. Y. City firm.

New Merck Construction

Merck & Co., Rahway, N. J., broke ground late last month for a new building to provide additional space for the Merck Institute of Therapeutic Research. The unit, a 3-story building of brick and concrete construction, will occupy a plot 47 by 100 ft. White Construction Co., N. Y. City, will begin erection at once.



VITAMIN CONSCIOUS?

Mamma Robin ignores the trees and shrubs to build a nest in the top of a fire extinguisher at Merck's plant. Sign demands complete silence.

Penick Adds New Line

S. B. Penick & Co., N. Y. City, will serve as exclusive distributor for a new vitamin "A" concentrate developed by Biochemical Products Corp., Evanston, Ill. The improved concentrate is said to be crystal-clear, and free from undesirable odors and flavors.

Fischer Returns From Coast

V. H. Fischer, secretary of Dodge & Olcott Co., N. Y. City, and a member of the executive committee, Essential Oil Association of the U. S. A., returned last month from a trip to the West Coast with his wife and son.

Berg With Sterling

William H. Berg, formerly president, White Laboratories (pharmaceuticals), Newark, N. J., is now with Sterling Products, Inc. He has been long identified with the development of cod liver oil and its vitamin extracts.

Welcke In Europe

W. A. Welcke, vice-president, Fritzsche Bros., N. Y. City, is passing the summer in Europe, accompanied by Mrs. Welcke.

Supplying Bromine

Cranston Chemical Co., Pine Grove, O., is manufacturing bromine on a large scale from Lawrence County brines.

Buys General Laminated

General Electric Co. will purchase the equipment and facilities of General Laminated Products, Inc., of N. Y. Latter company has been distributor and fabricator of G-E Textolite Laminated materials and, under the new plan, G. E.'s Meriden, Conn., plant will assume those services. General Laminated Products of Illinois will continue as representative for Textolite Laminated materials in the mid-west.

U.S.I. To Hazard

U. S. Industrial Alcohol Co. and its subsidiary, U. S. Industrial Chemicals, Inc., both of N. Y. City, have appointed Hazard Advertising Corp., N. Y. City, their agency for all industrial advertising. Leslie S. Gillette, who recently resigned as advertising and sales promotion manager for the U. S. I. organization to become Hazard's executive vice-president, will continue to serve U. S. I., in the capacity of account executive for their advertising program.

Hazard Agency is one of the foremost and best-known agencies in the chemical field, including among its chemical clients some of the most familiar names.

Solvents

Further Price Declines In Important Solvents

Butyl Alcohols Reduced—July Solvent Volume at Low Point—Early Introduction of New Cars Expected to Speed Pick-Up of Demand—Petroleum Solvents Unchanged—

CONSUMPTION of solvents in July dropped somewhat from the volume reported in June, due largely to the curtailment in operations by the manufacturers of industrial coatings for the automotive industry. The slump, however, was not quite as pronounced as was earlier expected. Automotive production, while at the season's low point, was well above the corresponding figures for the previous year. The sale of automobiles has shown a contraseasonal gain, with the result that producers are rushing to complete their preparations for '40 models. This trend has forced coatings manufacturers to step up operating schedules and August promises to be a fairly satisfactory tonnage month for solvent manufacturers.

Important Price Changes

	July 31	June 30
ADVANCED		
None		
DECLINED		
Alcohol, butyl, tks.	\$0.07	\$0.07½
drs., c.l.	.08	.08½
secondary, tks.	.05½	.058
c.l., drs.	.06½	.068
Alcohol, isobutyl, ref'd, tks.	.058	.063
drs., c.l.	.068	.073
Butyl acetate, tks.	.07	.07½
drs., c.l.	.08	.08½
secondary, tks.	.05½	.058
drs., c.l.	.06½	.068

Butyl Alcohol Again Declines

Pricewise, the month's news dealt pretty exclusively with further declines. Quotations for normal and secondary butyl alcohol were lowered. The normal declined ½c, making carlots, drums, freight allowed, 8c per lb.; l.c.l. shipments 8½c; and tanks, 7c per lb. The decline in the secondary amounted to 3/10c. The carlot price for drums is now 6½c, freight allowed East of the Mississippi, while l.c.l. quantities are 7c and tanks 5½c.

The schedule for butyl acetate was also revised. Normal is now 8c in drums, carlots, freight allowed, a decline of ½c. Less than carlot quantities are 8½c and tanks 7c per lb. The drop in secondary material amounted to 3/10c, and drums in carlots are 6½c, freight paid East of the Mississippi, while l.c.l. shipments are 7c and tanks are 5½c per lb.

Revision In Isobutyl Alcohol

The revisions in butyl alcohol and butyl acetate were shortly followed by declines in isobutyl alcohol. Refined in tanks was reduced ½c to a basis of 5.8c, drums in carlot quantities to 6.8c, and l.c.l. quantities to 7.3c.

June Alcohol Production Off

Ethyl alcohol production in June totaled 16,827,178 proof gals., considerably less than in May, when 18,655,264 gals. were produced. In June of '38, the output was somewhat less, 16,395,185 gals. In the fiscal year ended June 30, the yield of ethyl alcohol was reported to be 201,007,109 gals., as compared with 201,033,858 reported for the previous year.

June's output of C. D. was 861,138 wine gals., nearly two-thirds less than in the like '38 month, when 2,492,965 gals. were produced. In May, 695,326 gals. were produced. C. D. removals in June, 813,449 gals., were almost exactly 33% below June, '38, when shipments totaled 2,437,779 gals. May's removals amounted to only 597,648 gals. Stocks in June, 655,994 gals., were less than in the previous June, when they totaled 699,772 gals. In May, C. D. accumulations were 608,807 gals.

C. D. production during the fiscal year, 17,179,432 gals., was about 31% less than in the previous year, when the volume amounted to 25,598,717 gals.

The output of S. D. for June was reported to be 7,304,529 gals., substantially greater than in June of '38, when 5,376,531 gals. were reported. May's volume was 7,795,113 gals. Deliveries of S. D. amounted to 7,130,302 gals., in contrast to the 5,374,308 of the like '38 month; May removals, however, were almost as large—7,605,163 gals. Stocks continue to swell in volume, for 1,325,563 gals. were on hand at the end of June, nearly 175% as much as in the previous June.

In the fiscal year, the production of S. D. came to 83,563,044 gals., as compared with the 69,009,024 of the '37-'38 year—a gain of almost 20%.

Output of Synthetic Methanol Up

The output of synthetic methanol during the first 6 months of '39, 13,487,041 gals., compares more than favorably with that reported for the same period last year, 12,997,300. Production during June amounted to 2,295,288 gals., a substantial increase over June, '38, when 1,629,570 gals. were reported; in May of this year, 1,778,581 were produced.

Petroleum Solvents Steady

In the petroleum solvents group no important price revisions were announced in the last 30 days. Price shading in the Chicago area was said to be pretty much unchanged and the market generally lacked the firmness there which characterized other sections of the country. The demand for Rubber Solvent held up well in the past month as did the call for cuts used in the dry-cleaning field, but a rather sharp drop in shipments of solvents used in the coatings field was noted.

W. W. Angus Formed

W. W. Angus, Inc., is now exclusive sales distributor for Kessler Chemical Corp., N. Y. City. Mr. Angus, with Kessler for 14 years, will maintain the same N. Y. office, and all former Kessler sales agents will continue to represent the Angus organization. New firm will handle Kessler products, and the lacquer solvents of the latter's parent company, American Distilling Co.

Data on "Cellosolve Solvents"

Carbide and Carbon Chemicals has just issued Chemical Group Folder No. 3, "Cellosolve Solvents," 3rd of a series designed to present concisely information on industrial organic chemical families.

Std. of Ind. 100 Years Old

Standard Oil of Indiana celebrated its golden anniversary in June. The occasion was observed by outings attended by Whiting (Ind.) employees at Whiting, and by the Chicago office at Riverview Grove, on June 17 and 18.

Erects New Warehouse

Ecclestone Chemical Co., Detroit, Mich., has erected a new warehouse for flammable solvents, in connection with the establishment of a division for manufacturing specialized products.

Study of the Patent System

Some interesting highlights on patents are given in the August issue of *Priorities*, house organ of Prior Chemical Corp., N. Y. City. The importance of the patent system to the development of American industry is briefly sketched and some of the more noted inventions contributing to that development are mentioned. In lighter vein, the story mentions the vast number of patents issued on mere gadgets and the innumerable applications made for patents on such impossible and visionary ideas as devices for perpetual motion. In like mood is treated the high expectations of riches entertained by lone inventors.

The Question of Safety

U. S. Bureau of Mines has prepared a paper, "Coordination of Safety and Employment," stressing the necessity of management's taking an active part in the promotion of safety and the need for the like cooperation of employees. Ideas for conducting safety campaigns are presented, and much other practical information. Copies of this paper (Information Circular No. 7079) may be obtained from the Bureau, at Washington, D. C.

 Prepared Monthly by the U. S. Industrial Chemicals, Inc.

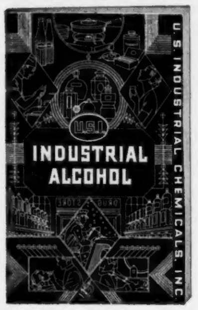
USI **SOLVENT NEWS** Reg. U.S. Pat. Off. USI

August ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1939

New Alcohol Manual Published by U.S.I.

96 Page Handbook Lists Formulas, Uses, Regulations, Technical Data

A completely revised edition of U.S.I.'s handbook, Industrial Alcohol, long relied on as a handy reference and guide by many users, has just been issued.



The new book incorporates all the latest changes in authorized C.D. and S.D. formulas and gives the industrial alcohol user, for the first time in convenient form, a complete record of the authorized uses for specially denatured alcohol under the present code system of classification. This system, announced in SOLVENT NEWS for February 1939, classifies the uses for S.D. alcohol under 15 broad divisions, about 90 subdivisions.

For the convenience of the reader, sections have been devoted to Pure, Completely Denatured, and Specially Denatured Alcohols, and to U.S.I.'s proprietary products—SOLOX, SUPER PYRO, and U.S.I. Denatured Alcohol Anti-freeze. Under each section is a working summary of Government Regulations. The authorized composition and uses for each formula, together with physical properties and commercial information, are also included.

A special section is devoted to technical information which includes U.S.P. Methods of Testing, tables on physical characteristics, gauging of tank cars and other pertinent data.

Every user of industrial alcohol will find this new U.S.I. book, Industrial Alcohol, indispensable as a ready reference manual. A copy may be obtained by sending a request on your business letterhead.

Insect Repellent & Suntan Lotion Employs U.S.I.'s "BMOO"

WASHINGTON, D. C. — Under the trade name BASK—Kilgore Development Corporation, on an exclusive basis, is offering in certain localities, through drug, sporting, and specialty stores, a combination Suntan and Insect Repellent lotion, in which U.S.I.'s new product Butyl-mesityl-oxide-oxalate, "BMOO," is the active ingredient.

"BMOO," produced exclusively by U.S.I., is fully described in this issue. Inquiries should be referred to U.S.I.

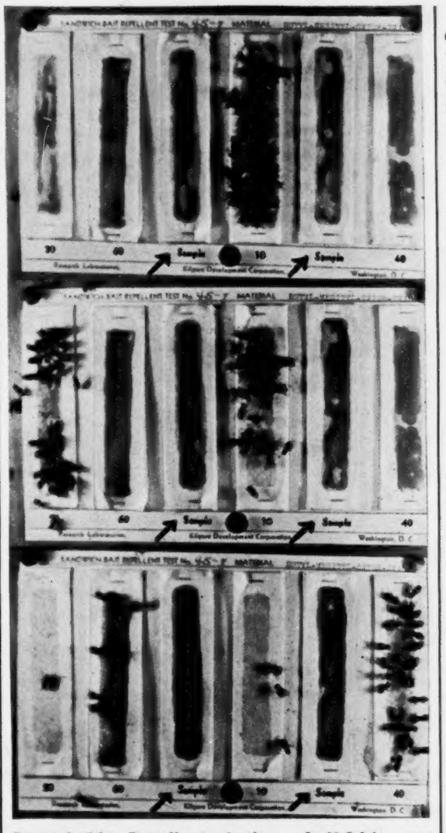
Early reports indicate BASK has met with phenomenal success in the brief time it has been on the market this summer. Due to increasing interest in this dual purpose product, it is planned, eventually, to widen the market for BASK to a national scale.

Samuel Stroock

Samuel Stroock, cofounder and vice-president of Stroock & Wittenberg Corporation, U.S.I. affiliate, died at his home in New York, June 30th, at the age of 41, following a prolonged illness. Mr. Stroock was long prominently identified with the natural and synthetic resins industry. His passing came as a severe shock to his many friends and associates.

New Activator for Insecticides Boosts "Kill Power," Cuts Costs

Solution of Derris Extractives in New U.S.I. Organic Chemical Gives Higher Kill Per Unit Cost, Adds Amazing Repellent Effect



Remarkable Repellent Action of U.S.I.'s new Butyl Mesityl Oxide Oxalate is clearly shown in the test photos above. A 10% concentration in alcohol (sample at arrow) is compared with standard 20, 60, 10 and 40% concentrations of citronellol. Photos from top to bottom show flies attacking (1) 10% citronellol after 25 minutes, (2) 10 and 20% citronellol after 50 minutes and (3) gathered on the 40 and 60% citronellol baits after 4 hours and 30 minutes. Note that at no time did the flies touch the 10% sample under test.

New insecticide formulations, made from currently available active ingredients, are proving many times more effective through addition of a newly developed concentrate manufactured by U. S. Industrial Chemicals, Inc.

This new concentrate, known as DEREX, is a solution of derris root extractives in a recently developed auxiliary solvent, Butyl Mesityl Oxide Oxalate.

Information and illustrations in this article are based on experimental work done by an independent laboratory.

It is offered exclusively by U. S. I. as a raw material for incorporation in liquid insecticidal sprays for use in the household, for livestock, and in many other places where such insecticides are required. DEREX is available in two forms: standard, containing rotenone; and special, containing no rotenone but of the same insecticidal strength.

Does Not Increase Odor

The use of DEREX in kerosene-type contact insecticides confers two important advantages. First, it provides an insecticide manufacturer with a sure and economical way of incorporating rotenone or rotenone-bearing extractives, both of which have long been recognized as having higher insecticidal activity per unit cost of any material available. DEREX makes this possible for the first time without increasing the odor of the finished insecticide. Because of the unusual solvent power of Butyl Mesityl Oxide Oxalate, the insecticides containing DEREX have an extended shelf life without loss of active principles occurring.

DEREX should not be confused with solutions of rotenone and derris extractives in inert solvents, where the insecticidal activity is due solely to the dissolved substances. Butyl Mesityl Oxide Oxalate acts not only as a solvent in DEREX but also has insecticidal prop-

(Continued on next page)

Adhesion of Cellulose Acetate Films Reported Greatly Improved by Addition of Oxidation Product

ROCHESTER, N. Y.—A method for improving the adhesive qualities of lacquers containing cellulose acetate by the addition of a small percentage of oxidized cellulose acetate is reported by two inventors here.

The process, covered by a U. S. patent, outlines a method for preparing the oxidized cellulose acetate by holding 100 parts of cellulose acetate in suspension in a solution of 10 parts potassium permanganate, 13.5 parts sulphuric acid, 1500 parts water until the $KMnO_4$ is completely discolored—about three hours. It is then treated with water containing sulphur dioxide to remove the manganese dioxide, washed with distilled water and dried.

The resulting product is said to be compatible in all proportions with cellulose acetate. Lacquers with oxidized cellulose acetate, cellulose acetate and plasticizer are reported to have highly satisfactory adhesion, flexibility and resistance to water. A typical formulation dissolves 10 parts by weight of low-viscosity cellulose acetate and 2 parts of oxidized cellulose acetate in the following solvent mixture:

Acetone	50%
Ethylene glycol monomethyl ether	20%
Toluene	15%
Methyl acetate	15%

Any lower alkyl phthalate such as diethyl phthalate may be added as a plasticizer.

Films formed with this solution are reported to have adhesive qualities equal to any typical commercial nitrocellulose lacquer.

August ★ SOLVENT NEWS ★ 1939

Short Cut In pH Procedure With Quinhydrone Electrode

BALTIMORE, Md.—The usual method of pH determinations with the Quinhydrone Electrode is to add an excess of solid quinhydrone to the solution.

A short cut reported by U.S.I.'s laboratories here is to add approximately 5 cc. of a saturated solution of quinhydrone in C. P. Acetone per 100 cc. of solution to be tested. (The saturated solution contains about 44 gms. of quinhydrone per litre.)

This method not only saves the time required to dissolve the quinhydrone in the solution but also eliminates wasting the reagent, as the tendency is to add a greater excess than is necessary.

New Insecticide Activator Of Derris Extractives

(Continued from previous page)

erties of its own. Thus, with DEREX, the manufacturer can obtain higher "kill power" for his sprays without increase in cost, or obtain the same "kill power" at a reduction in cost.

This was strikingly demonstrated in recent tests which showed that by the use of DEREX, savings up to 50% in the cost of active ingredients could be accomplished. However, the use of DEREX is not merely limited to pyrethrum-type insecticides. In combination with other synthetic materials, such as the thiocyanate paralytic agents, it has demonstrated similar advantages, namely, higher "kill" and lower cost.

The second advantage of adding DEREX to insecticides is that the solvent, Butyl Mesityl Oxide Oxalate is many times more effective and lasting as an insect repellent than any other material of this type now available. For example, when 5% alcoholic solutions of Butyl Mesityl Oxide Oxalate were tested against the same strength solutions of 20:1 pyrethrum and of oil of citronella, the Butyl Mesityl Oxide Oxalate showed 100% effectiveness against flies for over 19 hours, and the other two products showed only 25% to 75% effectiveness and were entirely exhausted after 2 to 2½ hours. It may, therefore, be expected that similar repellent effect will be carried through to the insecticide when DEREX is incorporated in the formula.

Non-Poisonous to Humans

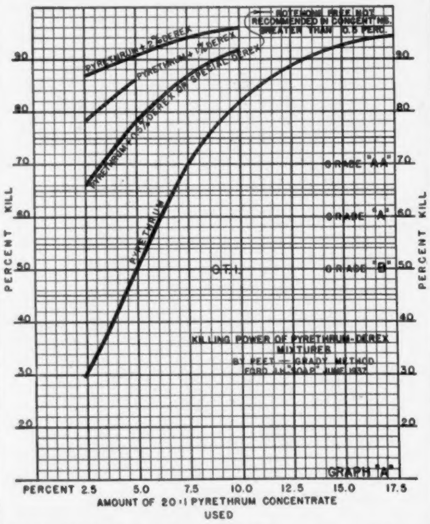
In spite of its high effectiveness and "kill power" against insects, Butyl Mesityl Oxide Oxalate has been shown by toxicological studies to have no effects when ingested. In addition, topical applications show no effects upon the human skin.

U. S. I. will offer to manufacturers two grades of DEREX which comprise a solution in Butyl Mesityl Oxide Oxalate of (1) derris extractives containing rotenone and (2) derris extractives, rotenone free. Further information may be secured by writing to U. S. I.

The name DEREX is a registered Trade-Mark of U. S. Industrial Chemicals, Inc.

Alcoholic Composition Aids Rapid Drying of Photo Film

NEW YORK, N. Y.—A patent covering an alcoholic composition to promote the quick drying of photographic film has been issued to an inventor here. The formulation requires a volatile, low molecular weight alcohol such as ethyl alcohol as the base of the composition in which are incorporated smaller amounts of glycerol or ethylene glycol and an agent capable of hardening or tanning gelatin such as formaldehyde, according to the patent.



THIS CHART showing the killing power of Pyrethrum-DEREX Mixtures as determined by the Peet-Grady Method, clearly illustrates the remarkable effectiveness of this new product in increasing the efficiency of pyrethrum-type insecticides. A similar chart, showing the increased killing power of Lethane 384-DEREX Mixtures, is available. Copies may be obtained by writing to U.S.I.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

A new coating material for paper, paper-board, metal, leather, glass, etc., is said to resist oils, gasoline, greases. It is also claimed to be useful in printing inks where it adds gloss and can be used as a carrier for dyes, pigments, etc. It is dissolved in alcohol for application. **(No. 239)**

U S I

Viscosity readings from 75 to 1,000,000 are obtainable with a single instrument of the falling ball type. A recent announcement states the apparatus is equipped with an electronic indicating mechanism for use with opaque liquids of any kind, according to the report. **(No. 240)**

U S I

"Chromium Plate" is used to describe a new metallic coating. It is an extremely fine metallic powder, and, according to the manufacturer, will produce a finish closely resembling chromium plating when the proper vehicle is employed. It is claimed to have excellent covering capacity and to be economical in use. **(No. 241)**

U S I

Spreading resins, caseins, and other liquid glues and bonding materials in commercial veneer and laminating work is simplified with a new machine said to apply a uniform film of adhesive in adjustable thickness. **(No. 242)**

U S I

Protection of metal surfaces from oxidation and corrosion by acid fumes is claimed for a new transparent coating that is also said to form an excellent base for paints. This new product is suggested as especially suitable for guarding metal sheets from rust. The manufacturer states it will not affect the metal surface and may be removed, if desired, by mild solvents. **(No. 243)**

U S I

Stripping baked synthetic enamels from metals such as aluminum, steel, zinc base die castings and magnesium alloys without etching or attacking them is claimed for a new product. The manufacturer states that it is non-caustic, will completely remove the enamel in from 1 to 3 minutes and leaves the metal clean and bright without the deposition attending the use of alkaline strippers. **(No. 244)**

U S I

Sealing interior surfaces of cast parts such as crankcases, headstocks, housings, and to retain any sand particles which may remain after cleaning is the purpose of a new lacquer. The material is reported not to chip or flake as a result of shock or abrasion, to be unaffected by oils or refrigerants. It can be applied by spraying or slushing. **(No. 245)**

U S I

New wide-range pH test papers covering the entire pH range and giving determinations correct within 0.5 unit are reported available. Five different papers and 14 buffer solutions produce the characteristic color for any pH unit and comprise the equipment according to the manufacturer. **(No. 246)**

U S I

A permanent marking ink for glass and porcelain requires only an ordinary pen for application, according to a current report. It is also stated that the ink dries very quickly and can be removed only with an abrasive. Four colors—white, blue, black and red, are offered. **(No. 247)**

U.S. INDUSTRIAL CHEMICALS, INC.

60 EAST 42ND ST., N.Y. (U.S.I.) BRANCHES IN ALL PRINCIPAL CITIES

A SUBSIDIARY OF U. S. INDUSTRIAL ALCOHOL CO.

ALCOHOLS
- Amyl Alcohol
- Butyl Alcohol
- Fusel Oil—Refined
- Methanol

Ethyl Alcohol
- Anhydrous
- Absolute
- C. P. 96%
- Pure (190 proof)
- Specially Denatured
- Completely Denatured
- U. S. I. (Denatured Alcohol Anti-freeze)
- *Super Pyro Anti-freeze
- *Solox Proprietary Solvent

***ANSOLS**
- Ansol M
- Ansol PR

ESTERS, ACETATES
- Acetic Ether
- Amyl Acetate
- Butyl Acetate
- Ethyl Acetate

ESTERS, ETHYL
- *Diatol
- Diethyl Carbonate
- Diethyl Oxalate
- Ethyl Chlorocarbonate
- Ethyl Formate
- Ethyl Lactate

*Registered Trade Mark

ESTERS, PHTHALATES
- Diamyl Phthalate
- Dibutyl Phthalate
- Diethyl Phthalate
- Dimethyl Phthalate

OTHER ESTERS
- Amyl Propionate
- Butyl Propionate
- Dibutyl Oxalate

INTERMEDIATES
- Acetoacetanilid
- Acetoacet-o-chloranilid
- Acetoacet-o-toluidid
- Ethyl Acetoacetate
- Sodium Ethyl Oxalacetate

ETHERS
- Ethyl Ether
- Ethyl Ether Absolute—A.C.S.

OTHER PRODUCTS
- Acetone, C.P.
- Butyl-mesityl-oxide-oxalate
- Cellulose Acetate
- Collodions
- *Curbay Binders
- *Curbay X (Dried Curbay)
- *Derex
- Ethylene
- Methyl Acetone
- Nitrocellulose Solutions
- Potash, Agricultural
- *Vacatone

News of the Specialties

¶Westvaco Acquires Magnesol — Royce Celebrates Tenth Anniversary — American Cube Syndicate to Appeal to Supreme Court — Other News of the Specialty Companies —

Westvaco Chlorine Products has acquired control of The Magnesol Co., which manufactures a line of products used for purifying oils and solvents. The officers of the new corporation are: Maurice E. Gilbert, president; Louis Neuberg, Albert M. Pitcher and Max Y. Seaton, vice-presidents; and William N. Williams, secretary-treasurer.

Royce Honored

Royce Chemical Co., Carlton Hill, N. J. observed its 10th anniversary July 7, by giving a dinner-dance for its staff at the Colonial Inn, Singac (N. J.). Forty-eight men and women were presented with 5-year and 10-year service pins. Albert J. Royce, head of the firm, was presented with a diamond service pin.

M.G.K. Chairman Dies

Alexander McLaughlin, 77, died July 7 in Minneapolis. He was the founder, and chairman of the board, of McLaughlin, Gormley, King, manufacturer of chemicals, miller, and importer. He was forced to retire from active duty in 1934 because of poor health, and was elected head of the board in the following year—the same in which the firm withdrew entirely from the crude drug business.

New A.S.T.M. Data

At the A. S. T. M.'s June convention, Committee D-12 on Soaps and Other Detergents presented 6 new specifications covering: Sodium metasilicate, trisodium phosphate, palm oil bar soap, palm oil chip soap, powdered built soap, and soap powder. New analytical procedures for determining carbon dioxide in caustic soda (evolution method), and for determining trisodium phosphate and sodium metasilicate, were also described. Tentative definitions were announced, covering: Break soap powder, cleaning, scouring, soap powder, soapy alkaline detergent, and washing.

Scholler Constructs Unit

Scholler Bros., Philadelphia, is constructing a modern, 2-story laboratory building of brick and glass construction. Company, manufacturer of textile soaps and finishes, will have in the completed addition to the plant 20,000 sq. ft. of work space.

A.C.P. Files Appeal

American Chemical Paint Co., Ambler, Pa., filed appeal in Circuit Court of Appeals, Cincinnati, July 12, from a decision rendered last January in District Court, Cleveland, in patent infringement suit against Firestone Steel Products Co. of Akron. Former company charges Firestone with infringement of Patent 1,608,622 covering alleged improvements in a process preventing dissolution of iron and steel in acid pickling baths. The Cleveland court had awarded the Akron firm its costs, and dismissed the suit.

To Go To Supreme Court

American Cube Syndicate, and associated plaintiffs, will appeal to the U. S. Supreme Court the finding by the Circuit Court that Agicide Laboratories had not infringed any basic claim of the Dennis patent, which involves the use of cube root as an insecticide.

In New Positions

Dr. Otto Stein, formerly with Rohm & Haas, Philadelphia, has become a member of the research staff of Alrose Chemical Co., Cranston, R. I., manufacturer of textile chemicals.

C. R. Payne has been elected a director and vice-president of Atlas Mineral Products, Mertztown, Pa. Since 1935, he has been company's director of research.

Raymond B. Seymour has resigned his post with Goodyear Rubber, Akron, to join the research staff of Atlas Mineral Products, Mertztown, Pa.

Albin Johnson has joined the Technical Development staff of Quaker Chemical Products Co., Conshohocken, Pa. He was formerly with the research staff of E. F. Houghton, Philadelphia.

"Bob" Pearce is now sales promotion manager of Riverside Chemical Co., St. Louis, and will also take charge of sales in that area. He was formerly with Carman Co. in the Midwest and, more recently, editor of *Cleaning and Dyeing World*.

Zophar Mills, Inc., Brooklyn, N. Y., has appointed H. P. Norden sales representative of its Chemical Specialties Division.

Hermann At Plattsburg

Stanford L. Hermann, purchasing agent, Apex Chemical Co., N. Y. City, served as instructor in Chemical Warfare at Plattsburg, N. Y., C. M. T. C. Camp during the 2 weeks, July 24-Aug. 7.

New Textile Specialty Firm

Some of the former members of the W. H. & F. Jordan, Jr., Mfg. Co. have organized the Amalgamated Chemical Corp., which will manufacture textile wet-processing materials. New firm is headed by Harold B. Dohner, assisted by R. A. Bruce, vice-president, and others well known to the textile field. Offices and plant are located in Philadelphia.

Clorox Signs With C.I.O.

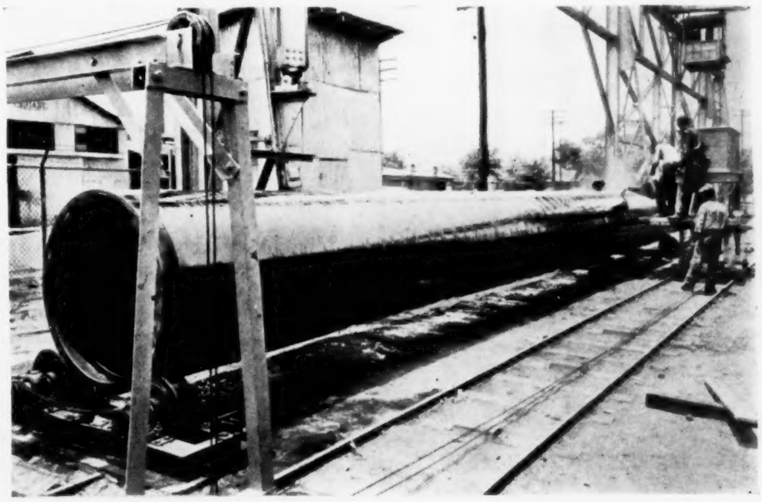
Clorox Chemical Co., Jersey City, N. J., has signed a contract with the C. I. O., providing for sole bargaining rights, 5-day week and 8-hour day, with 50c an hour as the minimum wage for women and 70c for men.

Aridye Opens Greenville Office

Aridye Corp., Fairlawn, N. J., has opened a new office in Greenville, S. C. C. M. Robbins will be manager, assisted by W. B. DePass and C. H. Patrick.

Issues Additional Licenses

New Wrinkle, Inc., Dayton, O., has issued licenses to The Paraffine Companies, San Francisco, and Buckeye Paint and Varnish Co., Toledo. Both firms will engage in the production of Wrinkle Finishes under the licensor's patents.



A section of the 44-mile pipeline for Birmingham, Ala., new industrial water supply system coated inside and out with a Bitumastic enamel, product of Wailes, Dove-Hermiston Corp., N. Y. City.

Coal-Tar Chemicals

Phenol Quotations Lowered 1½¢ Per Pound

Tanks Now Quoted at 12c—Increased Productive Capacity Forces Decline—Coal-Tar Solvents Firm—Coking Operations Up in June—Further Gains Expected Next Month—

THE outstanding development in the market for coal-tar chemicals last month was the definite revision of the schedules for phenol. The weakness in this material was briefly mentioned in the July market report. The decline amounted to about 1½c, and on the new basis, carlots, drums, are quoted at 13c, and tanks at 12c. The action of the producers was not entirely unexpected. Competition has been particularly keen for some months, and the prospect of additional productive capacity certainly did not lend any firmness to the price structure.

Scarcity of Benzol Continues

The coal-tar solvents continued to hold their specially firm price position. Available stocks of toluol, xylol, solvent naphtha and benzol were none too plentiful and some delays were reported by suppliers of benzol in making deliveries in certain parts of the country. With coking operations again pointing upward the scarcity of stocks of coal-tar solvents is likely to be much less pronounced over the next 30 days, but, on the other hand, the demand is expected to rise sharply as manufacturers of industrial coatings increase production schedules.

Dyes in Fair Demand

Aside from the solvents the demand for other important coal-tar chemicals proved to be somewhat spotty in July. The sale of coal-tar colors was comparatively better than the movement of intermediates. Manufacturers of disinfectants increased slightly their orders for tar-acid oils and a fairly firm price situation was reported in cresylic following the sharp declines made by domestic producers in June. The seasonal business in refined naphthalene in the past couple of weeks has shown signs of dropping off, but the total was fairly satisfactory to the producers. Crude imported naphthalene was advanced by most factors 5c per 100 lbs. to a basis of $1.60, but actually very little business was placed in the past 30 days.

Utilities Buy Creosote

A slightly better demand was reported for creosote with the railroads and public utilities the largest buyers. Despite the general spotty condition of the markets for coal-tar acids, intermediates and colors, the price structure during the period under review presented an exceptionally firm appearance.

Important Price Changes

	July 31	June 30
ADVANCED		
Naphthalene, crude, imp.	$1.60	$1.55
DECLINED		
Phenol, U. S. P. c. l.	.13	.14½
tks.	.12	.13½

Byproduct coke production in June totaled 3,089,721 tons, almost 33% greater than in the previous like month. The June output was a good 28% above the May figure, 2,396,435 tons. In the first 6 months of this year, 18,284,163 tons of coke were made in byproduct ovens—about 25% more than in the first half of '38, when 14,716,546 were produced.

Benzol output in June jumped to 7,992,000 gals., an increase of almost 65% over the like month last year, when 4,413,000 gals. were produced. Compared with May, when 5,456,000 gals. were reported, the current June volume gained about 37%. During the half-year ended June 30, 42,553,000 gals. of benzol were produced, about 33% more than during the same 6 months of '38.

Light Oil Recovery Up

Recovery of light oil during June totalled 12,471,396 gals., compared with only 9,675,128 gals. in the preceding month, and with 8,528,529 gals. in June, '38. For the first 6 months the total output amounted to 73,811,237 gals., a decided increase over the 60,760,442 gals. in the corresponding month of the year previous.

June tar production was reported at 37,806,644 gals., as compared with 29,329,847 gals. in the preceding month, and with but 25,966,586 gals. in June of last year. Production of tar for the first 6 months of '39 reached 223,755,643 gals., as contrasted with but 184,995,710 gals. in the like period a year ago.

Plans 2nd Pilot Plant

United Gas Improvement Co., Philadelphia, is planning to build a second pilot plant, in line with its study of the possibilities of obtaining valuable derivatives from water gas tars and their light oil constituents. New unit, which would be ready next spring, supplements the present test plant, which has been operating for about 2 years.

Jap. Dye Exports Up

The sharp advance in Japan's dyestuffs export trade in recent months reflects the resumption of activity of Japanese and Chinese textile mills in the areas in China now under Japanese control, China being by far the most important market for such products. Increased shipments of dyestuffs have also been made to Manchuria and Kwantung Province during the current year.

Data On Coal Analysis

Revised edition of Technical Paper 8, "Methods of Analyzing Coal and Coke," has recently been published by the U. S. Bureau of Mines. This paper may be had by purchase from the Government Printing Office at Washington, 15 cents the copy.

Obituaries

Samuel Stroock, 41, vice-president, Stroock & Wittenberg Corporation, N. Y. City, died June 30, after a short illness. He was one of the founders of S. & W., and was an officer of the company since that time.

John Z. O'Donnell, 58, assistant director of the trade analysis division, Du Pont, died suddenly July 5 at his Wilmington (Del.) home. He had served with Du Pont for 35 years, most of them in the trade analysis division. Mr. O'Donnell is survived by his widow, Mrs. Martha Sheward O'Donnell, a daughter, Ruth M. O'Donnell, a son, Fred T. O'Donnell, and two brothers.

Michael B. Zimmer, 70, Chicago representative of Fritzsche Bros., died July 16 in Chicago. In February of last year he had become the 12th member of Fritzsche Bros. Quarter Century Club. His brother, Ben F. Zimmer, is company's vice-president in charge of the Chicago office.

Glenn H. Pickard, 60, paint and varnish consultant, July 21 at his home in Wilmette (Chicago), Illinois.

E. P. Wilbur, partner of Wilbur-Ellis Co., N. Y. City, July 25 in San Francisco.

Reginald P. Walden, 71, vice-president and director, Corn Products Refining Co., N. Y. City, died July 26 at his Rye (N. Y.) home after a short illness.

Thomas M. Rianhard, 75, former president of the Barrett Co., July 22 at Washington, Conn.

Horace E. Stump, 51, director of research, New England Lime Co., Canaan, Conn., July 10 at Sharon, Conn.

Charles A. Gamble, 57, senior assistant chemist for N. Y. Sugar Trade Labs., N. Y. City, on July 20, in his office.

Charles Wilson Luke, 54, a director of W. Va. Pulp and Paper Co., July 23 at his summer home in Falmouth, Mass.

Thomas LeClear, 63, chief chemist, Celanese Corp. of America, on July 25, in his Cumberland (Md.) office.

Agricultural Chemicals

Good Demand for Raw Materials Reported

Buyers Take Advantage of Maximum Discount On Potash—Contract Price On Sulfate Automatically Higher—Last Year's Fertilizer Consumption Estimated 7,554,000 Tons—

THE past month was a busy one for suppliers of important raw fertilizer materials. With practically all of the prices announced for the coming season, manufacturers and dealers devoted most of their activities to contract signing and all reports indicate that the volume of business placed was quite satisfactory.

The July price on sulfate of ammonia was the lowest possible on contract and all users availed themselves of this advantage. The maximum discount on potash ended on July 19. Suppliers of this item report that the tonnage contracted for greatly exceeded that sold in the corresponding period of last year.

Fertilizer sales in the South were seasonally dull aside from the movement of material for top-dressing purposes. In the Mid-West and Northern section sales are currently slightly disappointing.

Slight Gain In Consumption

Fertilizer consumption in the U. S. in the '38-'39 fiscal year is estimated by the N. F. A., at approximately 7,554,000 tons. This is based on tax tag sales in 17 States, which accounted for 71% of the total tonnage, and estimates for the remaining States. This figure will be subject to later revision when complete reports for the calendar year become available. Tonnage distributed by AAA is not included in the estimated total.

As compared with the preceding fiscal year, there was an increase of 0.2%. It is indicated that, with the exception of '36-'37, consumption in the year just ended was the largest since '29-'30.

Available information indicates that tonnage in the Northeast and Middle West was a little lower than in '37-'38, but this was more than offset by an increase in the South.

Total tag sales in the 17 States amounted to 5,385,709 tons for the fiscal year. This represented an increase of 2% over the preceding year but it was 8% under '36-'37. Aggregate sales in the South were up 3%, with 8 of the 12 States reporting gains. The largest increases were in North Carolina, Arkansas, and Texas. Tag sales in the 5 Midwestern States for the year showed a 4% decline, with all of the 5 States reporting moderate losses.

Sharp Rise In Sulfate Output

Ammonia sulfate output in June was 42,253 short tons, marking a sharp rise over the previous month's 33,064.5 tons, and far in excess of last June's 27,967 tons. In the first 6 months of the current year, ammonia sulfate production totaled 249,158 tons, almost 25% greater than in the corresponding '38 half.

Important Price Changes

ADVANCED	July 31	June 30
Blood, high-grade, Chgo.	$2.35	$2.30
imported	2.70	2.65
DECLINED		
Bone Meal, dom., Chgo.	$25.00	$27.00
Hoofmeal, Chgo.	2.50	2.65
Nitrogenous material, imp.	2.40	2.50
Tankage, ungrd.	2.75	2.85
imported	3.10	3.15

Exports, Imports Up In May

Exports of fertilizers and fertilizer materials from the U. S. in May amounted to 148,095 long tons, valued at $1,986,519. Compared with May of last year tonnage was 16% larger and value 49% higher. The greater increase in value than in volume reflects the sharp rise in exports of potash, which have a relatively high value per ton. Total exports were 21,000 tons larger than a year earlier, with the increase in potash exports amounting to 17,000 tons. Increases over May, '38, were also reported for ammonia sulfate, hard rock, and superphosphate. Exports of synthetic sodium nitrate continued at a comparatively low level.

Sharp Rise In Potash Imports

Totaling 147,175 long tons, valued at $3,658,030, May fertilizer imports exceeded May of '38 by 17% in tonnage and 27% in value. The increase over last year was due to larger imports of potash salts and phosphatic materials. The rise in the latter group is partly fictitious, due to a reclassification of bone imports this year. In the nitrogenous group, small increases in ammonia sulfate and a few other materials were much more than offset by a drop in sodium nitrate.

Contraseasonal Gain In "Super"

Superphosphate production in May was somewhat larger than it had been in April, whereas there is usually a decline between these 2 months. Output in May in plants reporting to the N. F. A. totaled 241,000 tons, which compares with 239,500 tons in May of last year. A decline in the Northern Area was more than offset by an increase in the South. In the first 5 months of the year total production was moderately lower than in the corresponding period of 1938, the drop amounting to only about 2%. Production last fall was well below the preceding fall season, however, so that the tonnage produced in the first 11 months of the current fiscal year, from July through May, was 13% lower than in the year previous. July-May production in the Northern Area this year has fallen off by 310,000 tons while the decline in the South has amounted to only 110,000 tons.

Shipments in May were unusually large for the month, which resulted in a greater than usual seasonal decline in stocks. There was a particularly sharp drop in stocks in base and mixed goods, which were lower at the end of the month than at any time since 1933. Stocks of bulk superphosphate were the lowest for the last 2 years. A greater reduction has taken place in stocks at northern plants than at plants in the South, where production has been relatively well maintained.

Lang Retires

Joseph M. Lang, active in the fertilizer industry for over half a century, has retired as vice-president of Phosphate Mining Co., N. Y. City. He is succeeded by Thomas M. Peters, son of the late William R. Peters, former president.

Opens "Frisco" Office

N. V. Potash Export My., Inc., N. Y. City, will shortly open a San Francisco office in the Royal Crown Insurance Bldg.

South Carolina In Line

South Carolina is the 47th state to have enacted a law requiring that nitrogen-bearing fertilizers be guaranteed and sold on the nitrogen basis.

Valuable Insecticide Booklet

General Chemical Co. has published "A Working Knowledge of Insecticides and Fungicides," booklet containing detailed programs for treating common fruits and vegetables with insecticidal materials during all stages of their development.

Miller Expands

Miller Fertilizer & Chemical, Baltimore, has taken over and is operating the plant at Medina, N. Y., formerly known as New York Insecticide Co.

Carbide's Cleveland Offices

Cleveland district offices of Linde Air Products, Carbide and Carbon Chemicals, and Haynes Stellite, all units of Union Carbide, are now located at 1,517 Superior ave., Cleveland.

Dechema Moves Offices

The Dechema, German Chemical Engineering Society, has removed its offices (Dechema-, Achema- and Standard-office) from Berlin to Frankfurt a. M., Dechema-Haus, Bismarckallee 25, Telephone: 70511. A branch office will remain in Berlin, Haus des Vereins Deutscher Chemiker, Potsdamer str. 111, Berlin W. 35. Telephone: 219501.

Raw Materials

Corn Derivatives at Record Low Levels

Weakness in the Grain Forces Revisions in Dextrin and Starch—Better Demand for Natural Tanstuffs—Japan Wax Quoted Higher—Only Routine Demand for Turpentine—

BUYING of natural raw materials continued in the last 30 days very much along the lines that have prevailed now for several months. Purchasing agents are still holding to the policy of "hand-to-mouth" commitments, although in certain lines inquiries were more frequent and July business was definitely ahead of the volume in June.

Corn at 5-Year Low

Corn prices reached the lowest point in 5 years in the past 30 days and forced sharp declines in all of the important corn derivatives, including corn syrup, corn sugar, starch, and dextrin. Buyers were reported to have entered the market quite freely at the lower price figures.

Slightly greater interest was evidenced in natural tanstuffs. Tanners have been quite busy and there is every reason to believe that the industry will hold at a fairly high rate of operation over the next few months. Stocks of fibrous mangrove bark are again available. The non-fibrous material was slightly lower, the decline amounting to 25c a ton. Slightly lower prices were made on ground Sicilian sumac and also for the leaf material. Gambier, plantation, was offered at 8c, a decline of ¼c from the quotation at the end of June.

There was not quite as much interest in the natural varnish gums, but this trend was largely seasonal. Price changes were few and cables from primary points indicated strength. The shellac market was quiet, with prices unchanged from previously reported levels.

Sensational Rise In Japan Wax

The feature of the wax markets last month were the sensational rises in Bayberry and Japan. Demand for the former expanded and in the face of light stocks suppliers were forced to advance quotations. Cables from Japan indicated much higher replacement prices and, accordingly, the spot market responded sharply. Further declines were reported in most grades of Carnauba. Local competition was responsible for the failure of the market for Candelilla to go higher, despite the fact that replacement costs are definitely much higher.

Aside from the strength displayed by the dark grades of rosin late in the past month, the markets for naval stores were without special features. The rise in the dark grades reflected a sudden spurt in buying. Turpentine failed to gain ground in the face of indifferent interest.

Important Price Changes

ADVANCED	July 31	June 30
Albumen, egg, imp.	$0.63	$0.60
Pyrethrum, flowers,		
coarse	.33	.29
fine	.35	.30
concentrate (20-1)	7.15	6.45
(30-1)	10.65	9.55
Wax Bayberry	.25	.22½
Wax Japan	.12½	.11¼
DECLINED		
Corn syrup, 42°	$2.92	$3.07
43°	2.97	3.12
Corn sugar, tanners	2.89	3.04
Dextrin, British gum	3.55	3.70
Canary	3.30	3.45
White	3.25	3.40
Egg Yolk, dom.	.59	.60
Gambier, plantation	.08	.08¼
Gum Copal, Manila		
DBB	.07⅞	.08½
WS	.07⅞	.08¼
MA	.06⅛	.06⅜
MB	.05¾	.06
Starch, corn	2.40	2.55
powder	2.50	2.65
Mangrove bark, non-fib.	25.00	25.25
Sumac, grd.	65.50	66.00
leaf	68.00	69.00
Wax Carnauba,		
No. 3 chalky	.29	.29½
No. 3 N. C.	.30	.31
No. 1 yellow	.41	.41½
No. 2 yellow	.40	.41

National Buys Piel

Piel Bros. Starch Co., Indianapolis, Ind., has been purchased by National Adhesives Corp., N. Y. City. The Piel firm had been in business for over 40 years. The new owner will continue the manufacture of corn starch and other corn products at the plant.

New Lignin Producer

A Canadian chemical firm has been organized to produce lignin and other products from paper mill wastes. New company, Bellak Bros. & Simmons, Ltd., will make use of an "ersatz" process now in operation in Germany. The Bellak brothers were formerly chemical manufacturers in Czechoslovakia.

Senn Expands

George Senn, naval stores and raw materials broker, Philadelphia, has purchased from Atlantic Refining the Richmond (Pa.) bulk plant, Atlantic's second oldest plant. New owner will move from Philadelphia Bourse to the 2-story office building at Richmond.

Oils and Fats

BUYING of fats and oils continued along conservative lines in July. Despite a much larger number of inquiries that were about in the markets, actual purchasing was largely for replacement lots only. "Hand-to-mouth" buying continues to be the rule, the general exception being the drying oils.

Chinawood moved higher again. Consumers continue to be concerned about future supplies, but actual buying was limited by the fact that available spot material is very scarce. The new strength in chinawood was shared by other paint oils. Oiticica and perilla enjoyed sympathetic advances. Linseed, however, turned downward. The decline was due solely to the sharp drop in flaxseed. The crop this year is an outstanding one, particularly so in view of the small one just a year ago. A fair demand for linseed was reported by the crushers.

The fish oils generally were off in price from previous levels. All grades of refined menhaden and sardine went to lower levels in the past 30 days. Most of the animal fats and oils were also off from the prices prevailing on June 30. Cottonseed and lard prices are at the lowest levels in 5 years.

Most of the vegetable oils moved downward in price in the last 30 days. A large corn crop is expected. Despite the fact that farmers are raising or fattening hogs on corn instead of marketing it, the price of corn has dropped sharply. Production of lard this fall is likely to be above the totals for any of the past 5 years and this is driving the price to very low levels.

Cottonseed and lard are directly competitive and a direct price relationship exists between them. In anticipation of heavy lard production this fall members of Congress from cotton and corn-hog states are endeavoring to map out some program in order to take off surplus lard from the markets.

Important Price Changes

ADVANCED	July 31	June 30
Oil Chinawood, drs.	$0.22	$0.21½
tks.	.21	.20
Oil oiticica, drs.	.16	.13
Oil perilla, tks.	.11	.102
DECLINED		
Oil coconut, crude, tks.	$0.03	$0.03⅛
Oil corn, crude, tks.	.05¼	.06½
Oil lard, common, bbls.	.08⅛	.08½
Oil linseed, tks.	.087	.089
Oil menhaden, ref'd alk.		
tks.	.058	.064
ref'd, blown, drs.	.066	.072
kettle-bodied, drs.	.076	.082
light-pressed, tks.	.052	.058
Oil palm, Niger, cks.	.03⅝	.03¾
Oil palm, Sumatra, ship	.0265	.0275
Oil palmkernel, ship	.0350	.0360
Oil peanut, crude, tks.	.05¼	.05⅝
Oil sardine, crude	.24	.30
ref'd alk., tks.	.058	.064
kettle-bodied, drs.	.076	.082
light pressed, tks.	.0[illegible]2	.058
Oil soybean, crude, tks.	.05	.05⅛

American Maize Products, N. Y. City, appointed Paul Prentiss assistant district sales manager for northern Pennsylvania and upper N. Y. State. Paul Walters is now company's assistant district sales manager for California.

Pigments and Fillers

Casein Quotations Advanced Sharply

Supplies Low and Demand Improves—Lithopone and Zinc Sulfide Reduced—Cellulose Acetate Cut 1c—Tire Makers Take Larger Tonnages of Carbon Black—Vermilion off 3c—

THE downward trend in casein prices, which has been so pronounced for several months, was suddenly thrown in reverse last month. Substantial recovery in the price structure was reported. Production in the last few weeks has been considerably below normal, while consumption has improved.

The sudden and somewhat unexpected reduction of ⅜c in lithopone very early in July was briefly reported in the July issue. The new schedule for car lots is as follows:—high-strength material in bags, 5¼c per lb., and 5½c in barrels; ordinary material, 3¾c in bags, 4c in barrels; titanated material 5¼c in bags, and 5½c in barrels. The car lots are delivered either East or to the Pacific Coast. Less-than-car-lot loads are in each case ¼c more than the car lot prices, and are either delivered to the East or ex warehouse Pacific Coast.

Zinc sulfide also was reduced ⅜c per lb. The new schedule is as follows:—car lots in bags, 7½c, and in barrels, 7¾c; less than car lots in bags, 7¾c, and in barrels, 8c per lb. The car lots are delivered East or to the Pacific Coast, while smaller lots are delivered East or ex warehouse, Pacific Coast. The weakness in quicksilver caused suppliers of English red vermilion to revise prices downward. In 5-ton quantities the latest quotation is $1.59 per lb.

1c Decline In Cellulose Acetate

Lower prices were announced for both cellulose acetate and cellulose triacetate. In lots of 5,000 lbs. or more, single shipment, the new price of cellulose acetate is 35c, f.o.b. plant, freight allowed to destination. The same price now prevails on the triacetate as on the cellulose acetate.

Limited quantities of cellulose acetate propionate and cellulose acetate butyrate are now available based on the following price schedule:—

Propionyl or Butyryl Content

Quantity	Low Up to 9.9%	Medium 10% to 19.9%	High 20% to 40%
	Price Per Pound		
Less than standard 100 pound package	$0.44	$0.46	$0.48
100 to 900 lbs.	0.43	0.45	0.47
1,000 to 4,900 lbs.	0.42	0.44	0.46
5,000 lbs. or more	0.41	0.43	0.45

Both of these mixed esters have a specific gravity lower than that of cellulose acetate. They have a greater solubility range and increased compatibility with plasticizers, gums and resins, making them especially interesting to users of cellulose acetate who have found the simple ester not completely satisfactory.

Important Price Changes

ADVANCED		
Casein, dom., 20-30	$0.11	$0.08¾
80-100	.11½	.09¼
DECLINED		
Cellulose acetate	$0.35	$0.36
Cellulose triacetate	.35	.40
Lithopone, dom., bgs.	.03¾	.04⅛
bbls.	.04	.04⅜
Red vermilion	1.59	1.62
Zinc sulfide, bgs.	.07½	.07⅞
bbls.	.07¾	.08¼

The market for raw paint materials was somewhat spotty in the past 30 days. Demand for lead pigments improved considerably over the tonnage shipped in June, but a distinct slackening in the demand for zinc oxides was noted. On the other hand, shipments of carbon black were good for this particular period of the year. Most of the tonnage, however, was shipped to the tire makers and the demand from the paint makers was said to be only fairly satisfactory.

June tire shipments were 5,733,216 units, compared with 4,753,403 in May and 3,928,590 in June, 1938. This is the highest single month's shipment since June, 1933. Shipments for the first half of this year were 26,992,343 units, against 17,896,942 in the corresponding period last year. Tire production in June was 4,837,290 units, compared with 4,418,072 in May and 3,036,012 in June, 1938. For the first 6 months of this year production was 27,168,451 units, against 15,890,371 in the similar period last year. Casings in the hands of manufacturers on June 30 were 8,803,924, against 9,918,759 on May 31, and 8,470,304 on June 30, '38.

The building field has started the second half with such a substantial margin of activity that a gain for this year over 1938 seems inevitable, according to the F. W. Dodge Corp. Figures show that the dollar volume of residential contracts in 37 states was greater in '39 than in any similar period in 10 years. The 6-month contract total reached $664,527,000, or 61% more than for the same months last year. The non-residential contracts totaled $516,579,000, a gain of 19% over the 1938 half-year figure of $433,220,000. For all construction the figure this year was $1,699,364,000, about 17% above the '38 figure.

General Atlas Expands

General Atlas Carbon Co., N. Y. City, marks its 10th anniversary with the announcement that its new plant in Guymon, Oklahoma, will begin operations next month. General Atlas manufactures special process carbon blacks by the method in which the black is recovered from the combustion gases in a Cottrell electric precipitator.

Wins Permanent Injunction

Atlantic Research Associates, Newtonville, Mass., received from U. S. District Court, Eastern District of New York, a permanent injunction restraining Central Paint & Varnish Works, Brooklyn, N. Y., from the manufacture of casein solution embodying the inventions disclosed in U. S. Patent No. 1,893,608 and Reissue No. 16,175. Court ordered the payment by the defendant to the owner of the patent of a 5% royalty on all past infringing products.

I.C.I. To Make "Nylon"

Imperial Chemical Industries has entered into negotiations with Courtaulds for the formation of a joint company to manufacture in England "Nylon" yarns, by special arrangement with the Du Pont Company.

Construction

Mathieson Alkali is erecting an addition to its Lake Charles, La., plant for the production of "synthetic" salt cake. Company has withdrawn from the production and sale of gypsum, its North Holston, Va., works having been leased to National Gypsum, Buffalo.

General Chemical is erecting a half-million dollar addition to its Buffalo works. New construction includes the doubling of nitric acid production facilities.

Painesville, O., is to have a plant for the manufacture of new chemicals and alloys, Clifton Products, Inc. Company is owned and managed by R. E. and C. E. Windecker, and will begin operations about the first of the year.

Titanium Pigment Corp., St. Louis, is erecting a new administration and laboratory building at the main plant in St. Louis.

Ripley Chemical Corp., Huntington, W. Va., has been formed to manufacture salt products from Cabell County brines.

Vanadium Corporation of America intends to build a new furnace building at its Niagara Falls works. Building will cost in the neighborhood of $40,000.

The Citizens Gas and Coke Utility, municipally-owned manufactured gas system at Indianapolis, Ind., has ordered a Koppers Seaboard Process liquid purification system for its Prospect st. works, to be completed as soon as possible.

H. H. Rosenthal, president, H. H. Rosenthal & Co., N. Y. City, is vacationing this month in northern Maine.

Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1937 Average $1.10 - Jan. 1939 $1.25 - July 1939 $1.27

	Current Market		1939		1938	
			Low	High	Low	High
Acetaldehyde, drs. c-l, wks lb	...	.10	.10	.14	...	.14
Acetaldol, 95%, 50 gal drs wks lb.	.21	.25	.21	.25	.21	.25
Acetamide, tech, lcl, kgs lb.	.28	.50	.28	.50	.32	.60
Acetanilid, tech, 150 lb bbls lb.	...	.22	.22	.29	.29	.32
Acetic Anhydride, drs, f.o.b. wks, frt all'd lb.	.10½	.11	.10½	.11	.10½	.11
Acetin, tech, drs. lb.	...	.33		.33	...	.33
Acetone, tks, f.o.b. wks, frt all'd lb	...	.04¼	.04¼	.04¾	...	.04¾
drs, c-l, f.o.b. wks, frt all'd lb.		.05¾		.05¾	...	.05¾
Acetyl chloride, 100 lb cbys lb	.55	.68	.55	.68	.55	.68
ACIDS						
Abietic, kgs, bbls lb	.08¾	.09	.08¾	.09	.08¾	.10
Acetic, 28%, 400 lb bbls, c-l, wks 100 lbs	...	2.23	...	2.23	...	2.23
glacial, bbls, c-l, wks 100 lbs.	...	7.62	...	7.62	...	7.62
glacial, USP bbls, c-l, wks. 100 lbs.	...	10.25	...	10.25	...	10.25
Acetylsalicylic, USP, 225 lb bbls lb.	...	.40	.40	.50	.50	.60
Adipic, kgs, bbls lb.	...	.72	...	.72	...	.72
Anthranilic, ref'd, bbls lb.	1.15	1.20	1.15	1.20	1.15	1.20
tech, bbls lb.	...	.75	...	.75	...	.75
Ascorbic, bot oz.	2.75	3.00	2.75	3.25	...	...
Battery, cbys, wks 100 lbs.	1.60	2.55	1.60	2.55	1.60	2.55
Benzoic tech, 100 lb kgs lb.	.43	.47	.43	.47	.43	.47
USP, 100 lb kgs lb.	.54	.59	.54	.59	.54	.59
Boric, tech, gran, 80 tons, bgs, delv ton a	...	96.00	...	96.00	95.00	96.00
Broenner's, bbls lb.	...	1.11	...	1.11	...	1.11
Butyric, edible, c-l, wks, cbys lb.	1.20	1.30	1.20	1.30	1.20	1.30
synthetic, c-l, drs, wks lb.	...	.22	...	.22	...	.22
wks, lcl lb.	...	.23	...	.23	...	.23
tks, wks lb.	...	.21	...	.21	...	.21
Camphoric, drs lb.	5.50	5.70	5.50	5.70	5.50	5.70
Caproic, normal, drs. lb.	...	.35	...	.35	...	...
Chicago, bbls lb.	...	2.10	...	2.10	...	2.10
Chlorosulfonic, 1500 lb drs, wks lb.	.03½	.05	.03½	.05	.03½	.05
Chromic, 99¾%, drs, delv lb.	.15¼	.17¼	.15¼	.17¼	.15¼	.17¼
Citric, USP, crys, 230 lb bbls. lb. b	.20	.21½	.20	.22½	.22	.25
anhyd, gran, bbls lb. b	...	.23	.23	.25	.25½	.26½
Cleve's, 250 lb bbls lb.	...	.57	...	.57	.50	.57
Cresylic, 99%, straw, HB, drs, wks, frt equal gal.	.49	.50	.49	.64	.63	.91
99%, straw, LB, drs, wks, frt equal gal.	.55	.56	.55	.71	.69	.94
resin grade, drs, wks, frt equal lb.	.08¼	.09¼	.08¼	.09½	.09	.11¼
Crotonic, bbls, delv lb.	.21	.50	.21	.50	.21	1.00
Formic, tech, 140 lb drs lb.	.10½	.11½	.10½	.11½	.10½	.11½
Fumaric, bbls lb.	...	.75	...	.75	.60	.75
Fuming, see Sulfuric (Oleum)						
Gallic, tech, bbls lb.	.70	.73	.70	.73	.70	.79
USP, bbls lb.	.77	.81	.77	.81	.77	.91
Gamma, 225 lb bbls, wks lb.	...	.85	...	.85	...	.85
H, 225 lb bbls, wks lb.	.50	.55	.50	.55	.50	.55
Hydriodic, USP, 47% lb.	...	2.30	...	2.30	2.20	2.30
Hydrobromic, 34% conct 155 lb cbys, wks lb.	.42	.44	.42	.44	.42	.44
Hydrochloric, see muriatic						
Hydrocyanic, cyl, wks lb.	.80	1.30	.80	1.30	.80	1.30
Hydrofluoric, 30%, 400 lb bbls, wks lb.	.07	.07½	.07	.07½	.07	.07½
Hydrofluosilicic, 35%, 400 bbls, wks lb.	.09	.09½	.09	.09½	.09	.15
Lactic, 22%, dark, 500 lb bbls lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
22%, light ref'd, bbls lb.	.03½	.03¾	.03½	.03¾	.03½	.03¾
44%, light, 500 lb bbls lb.	.05½	.05¾	.05½	.05¾	.05½	.05¾
44%, dark, 500 lb bbls lb.	.06½	.06¾	.06½	.06¾	.06½	.06¾
50%, water white, 500 lb bbls lb.	.10½	.11½	.10½	.11½	.10½	.11½
USP X, 85%, cbys lb.	.42	.45	.42	.45	.42	.45
Lauric, drs. lb.	11¾	.12¼	.11¾	.12¼	.08½	.12¼
Laurent's, 250 lb bbls lb.	.45	.46	.45	.46	.45	.46
Levulinic, 5 lb bot wks lb.	...	2.00	...	2.00	...	2.00
Linoleic, bbls lb.	...	.20	...	.20	...	.20
Maleic, powd, kgs lb.	.30	.40	.30	.40	.30	.40
Malic, powd, kgs lb.	.45	.60	.45	.60	.45	.60
Metanillic, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Mixed, tks, wks N unit	.06½	.07¼	.06½	.07¼	.06½	.07¼
S unit	.008	.009	.008	.009	.008	.009
Monochloracetic, tech, bbls lb.	.16	.18	.16	.18	.16	.18
Monosulfonic, bbls lb.	1.50	1.60	1.50	1.60	1.50	1.60
Muriatic, 18°, 120 lb cbys, c-l, wks 100 lb.	...	1.50	...	1.50	...	1.50
tks, wks 100 lb.	...	1.00	...	1.00	...	1.00
20°, cbys, c-l, wks 100 lb.	...	1.75	...	1.75	...	1.75
tks, wks 100 lb.	...	1.10	...	1.10	...	1.10
22°, c-l, cbys, wks 100 lb.	...	2.25	...	2.25	...	2.25
tks, wks 100 lb.	...	1.60	...	1.60	...	1.60
CP, cbys lb.	.06½	.07⅛	.06½	.07⅛	.06½	.07⅛
N & W, 250 lb bbls lb.	.85	.87	.85	.87	.85	.87
Naphthenic, 240-280 s.v., drs lb.	.10	.13	.10	.13	.10	.13
Sludges, drs lb.	...	.05	...	.05	...	.05
Naphthionic, tech, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Nitric, 36°, 135 lb cbys, c-l, wks 100 lb. c	...	5.00	...	5.00	...	5.00
38°, c-l, cbys, wks 100 lb. c	...	5.50	...	5.50	...	5.50
40°, cbys, c-l, wks 100 lb. c	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lb. c	...	6.50	...	6.50	...	6.50
CP, cbys, delv lb.	.11½	.12½	.11½	.12½	.11½	.12½
Oxalic, 300 lb bbls, wks, or N Y lb.	.10¾	.12	.10¾	.12	.10¾	.12
Phosphoric, 85%, USP, cbys lb.	.12	.14	.12	.14	.12	.14
50%, acid, c-l, drs, wks lb.	.06	.08	.06	.08	.06	.08
75%, acid, c-l, drs, wks lb.	...	.07½	...	.07½	.07½	.10½
Picramic, 300 lb bbls, wks lb.	.65	.70	.65	.70	.65	.70
Picric, kgs, wks lb.	.35	.40	.35	.40	.35	.40
Propionic, 98% wks, drs lb.	...	.22	...	.22	...	.22
80% lb.	.16	.17½	.16	.17½	.16	.17½
Pyrogallic, tech, lump, pwd, bbls lb.	...	1.05	...	1.05	...	1.05
cryst, USP lb.	1.45	1.63	1.45	1.63	1.45	1.63
Ricinoleic, bbls lb.	...	.35	...	.35	.35	.38
tech, bbls lb.	...	.13	...	.13	...	.13
Salicylic, tech, 125 lb bbls, wks lb.	...	.33	...	.33	...	.33
USP, bbls lb.	.35	.40	.35	.40	.35	.45
Sebacic, tech, drs, wks lb.	...	nom.	...	nom.	.37	.41
Succinic, bbls lb.	...	.75	...	.75	...	.75
Sulfanilic, 250 lb bbls, wks lb.	.17	.18	.17	.18	.17	.18
Sulfuric, 60°, tks, wks ton	...	13.00	...	13.00	...	13.00
c-l, cbys, wks 100 lb.	...	1.25	...	1.25	...	1.25
66°, tks, wks ton	...	16.50	...	16.50	...	16.50
c-l, cbys, wks 100 lb.	...	1.50	...	1.50	...	1.50
CP, cbys, wks lb.	.06½	.07½	.06½	.07½	.06½	.07½
Fuming (Oleum) 20% tks, wks ton	...	18.50	...	18.50	...	18.50
Tannic, tech, 300 lb bbls lb.	.40	.47	.40	.47	.40	.47
Tartaric, USP, gran, powd, 300 lb bbls lb.	.27¼	.27¾	.27¼	.27¾	.24¼	.27¾
Tobias, 250 lb bbls lb.	.65	.67	.65	.67	.65	.67
Trichloroacetic bottles lb.	2.00	2.50	2.00	2.50	2.00	2.50
kgs lb.	...	1.75	...	1.75	...	1.75
Tungstic, tech, bbls lb.	1.70	1.80	1.70	1.80	1.65	2.00
Vanadic, drs, wks lb.	1.10	1.20	1.10	1.20	1.10	1.20
Albumen, light flake, 225 lb. bbls lb.	.52	.60	.52	.60	.52	.60
dark, bbls lb.	.13	.18	.13	.18	.11	.18
egg, edible lb.	.60	.64	.60	.78	.77	1.15
vegetable, edible lb.	.74	.78	.74	.78	.74	.78
ALCOHOLS						
Alcohol, Amyl (from Pentane) tks, delv lb.	...	.101	...	.101	.101	.106
c-l, drs, delv lb.	...	.111	...	.111	.111	.116
lcl, drs, delv lb.	...	.121	...	.121	.121	.126
Amyl, secondary, tks, delv lb.	...	.08½	...	.08½	...	.08½
drs, c-l, delv E, of Rockies lb.	...	.09½	...	.09½	...	.09½
Benzyl, cans lb.	.68	1.00	.68	1.00	.68	1.00
Butyl, normal, tks, f.o.b. wks, frt all'd lb. d	...	.07	.07	.08½	.08½	.09
c-l, drs, f.o.b. wks, frt all'd lb. d	...	.08	.08	.09½	.09½	.10
Butyl, secondary, tks, delv lb. d	...	.05½	.05½	.06	...	.06
c-l, drs, delv lb. d	...	.06½	.06½	.07	...	.07
Capryl, drs, tech, wks lb.	...	.85	...	.85	...	.85
Cinnamic, bottles lb.	2.00	2.50	2.00	2.50	2.00	2.50
Denatured, CD, 14, 13, c-l, drs, wks gal. e	.27½	.31½	.27½	.32	.31	.35
tks, East, wks gal.	...	.21½	.21½	.24	.23	.29
Western schedule, c-l, drs, wks gal. e	...	.34½	.34½	.37	.36	.38
Denatured, SD, No. 1, tks,	...	.19½	.19½	.22	.22	.27
c-l, drs, wks gal. e	...	.25½	.25½	.28	.28	.33

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; b Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.; y Price given is per gal.

c Yellow grades 25c per 100 lbs. less in each case; d Spot prices are 1c higher; e Anhydrous is 5c higher in each case; f Pure prices are 1c higher in each case.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

Prices Current

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Alcohols (continued):						
Diacetone, pure, c-l, drs, delv ....lb. *f*	...	.09	.09	.11½	...	.11½
tech, contract, drs, c-l, delv ....lb.	...	.08½	.08½	.10½	...	.10½
Ethyl, 190 proof, molasses, tks ....gal. *g*	...	4.46	4.46	4.48½	4.04	4.51½
c-l, drs ....gal. *g*	...	4.49	4.49	4.54½	4.10	4.59½
c-l, bbls ....gal. *g*		4.53	4.53	4.55½	4.11	4.58½
Furfuryl, tech, 500 lb drs lb.	.25	.35	.25	.35	.25	.35
Hexyl, secondary tks, delv lb.	...	.12	...	.12	...	.12
c-l, drs, delv ....lb.	...	.13	...	.13	...	.13
Normal, drs, wks ....lb.	3.25	3.50	3.25	3.50	3.25	3.50
Isoamyl, prim, cans, wks lb.	...	.32	...	.32	...	.32
drs, lcl, delv ....lb.	...	.27	...	.27	...	.27
Isobutyl, ref'd, lcl, drs..lb.	...	.073	.073	.09	.09	.10
c-l, drs ....lb.	...	.068	.068	.08½	.08½	.09½
tks ....lb.	...	.058	.058	.07½	.07½	.08½
Isopropyl, ref'd, 91%, c-l, drs, f.o.b. wks, frt all'd ....lb.	...	.36	...	.36	...	.36
Ref'd 98%, drs, f.o.b. wks, frt all'd .....gal.	...	.41	...	.41	...	.41
Tech 91%, drs, above terms ....gal.	...	.33½	...	.33½	...	.33½
tks, same terms ..gal.	...	.28½	...	.28½	...	.28½
Tech 98%, drs, above terms ....gal.	...	.37½	...	.37½	...	.37½
tks, above terms ..gal.	...	.32½	...	.32½	...	.32½
Spec Solvent, tks, wks gal.	...	.20½	.20½	.23	.23	.28
Aldehyde ammonia, 100 gal drs ....lb.	.80	.82	.80	.82	.80	.82
Aldehyde Bisulfite, bbls, delv ....lb.	...	.17	...	.17	...	.17
Aldol, 95%, 55 and 110 gal, drs, delv ....lb.	.11	.12	.11	.20	...	.20
Alphanaphthol, crude, 300 lb bbls ....lb.	...	.52	...	.52	...	.52
Alphanaphthylamine, 350 lb bbls ....lb.	.32	.34	.32	.34	.32	.34
Alum, ammonia, lump, c-l, bbls, wks ....100 lb.	3.40	3.65	3.40	3.65	3.40	3.65
delv NY, Phila ...100 lb.	...	3.40	...	3.40	...	3.40
Granular, c-l, bbls wks ....100 lb.	3.15	3.40	3.15	3.40	3.15	3.40
Powd, c-l, bbls, wks 100 lb.	...	3.55	...	3.55	...	3.55
Chrome, bbls ......100 lb.	6.50	6.75	6.50	6.75	6.50	6.75
Potash, lump, c-l, bbls, wks ....100 lb.	3.65	3.90	3.65	3.90	3.65	3.90
Granular, c-l, bbls, wks ....100 lb.	3.40	3.65	3.40	3.65	3.40	3.65
Powd, c-l, bbls, wks 100 lb.	3.80	4.05	3.80	4.05	3.80	4.05
Soda, bbls, wks ....100 lb.	...	3.25	...	3.25	...	3.25
Aluminum metal, c-l, NY 100 lb.	...	20.00	...	20.00	...	20.00
Acetate, 20%, bbls ...lb.	.07½	.09	.07½	.09	.07½	.10
Basic powd, bbls, delv. lb.	.40	.50	.40	.50	.40	.50
Chloride anhyd, 99%, wks lb.	.07	.12	.07	.12	.07	.12
93%, wks ....lb.	.05	.08	.05	.08	.05	.08
Crystals, c-l, drs, wks lb.	.06	.06¼	.06	.06¼	.06	.06¼
Solution, drs, wks ...lb.	.02¾	.03¼	.02¾	.03¼	.02¾	.03¼
Formate, 30% sol bbls, c-l, delv ....lb.	...	.13	...	.13	...	.13
Hydrate, 96%, light, 90 lb bbls, delv ....lb.	.12½	.13½	.11½	.13	.12	.13
heavy, bbls, wks .....lb.	.029	.03½	.029	.03½	.029	.03½
Oleate, drs ....lb.	.16¾	.18½	.16¾	.18½	.16¾	.18½
Palmitate, bbls ....lb.	...	.23	...	.23	...	.23
Resinate, pp., bbls ....lb.	...	.15	...	.15	...	.15
Stearate, 100 lb. bbls ..lb.	.16	.17	.16	.21	.19	.21
Sulfate, com, c-l, bgs, wks ....100 lb.	...	1.15	...	1.15	1.15	1.35
c-l, bbls, wks ....100 lb.	...	1.35	...	1.35	1.35	1.55
Sulfate, iron-free, c-l, bgs, wks, ...100 lb.	...	2.00	...	2.00	...	2.00
c-l, bbls, wks ....100 lb.	...	2.20	...	2.20	...	2.20
Aminoazobenzene, 110 lb kgs lb.	...	1.15	...	1.15	...	1.15
Ammonia anhyd fert com, tks lb.	.04½	.05½	.04½	.05½	.04½	.05½
Ammonia anhyd, 100 lb cyl lb.	.16	.22	.16	.22	.16	.22
26°, 800 lb drs, delv lb.	.02¼	.02½	.02¼	.02½	.02¼	.02½
Aqua 26°, tks, NH..cont.	...	.04z	...	.04z	...	.05**
tk wagon ....lb.	...	.02	...	.02	...	.02
Ammonium Acetate, kgs..lb.	.26	.33	.26	.33	.26	.33
Bicarbonate, bbls, f.o.b. wks ....100 lb.	5.15	5.71	5.15	5.71	5.15	5.71
Bifluoride, 300 lb bbls ..lb.	.14½	.16½	.14½	.16½	.14½	.17
carbonate, tech, 500 lb bbls ....lb.	.08	.12	.08	.12	.08	.12
Chloride, White, 100 lb bbls, wks ......100 lb.	4.45	4.90	4.45	4.90	4.45	4.90
Gray, 250 lb bbls, wks .... 100 lb.	5.50	6.25	5.50	6.25	5.50	6.25
Lump, 500 lb cks spot lb.	.10½	.11	.10½	11.	.10½	.11
Lactate, 500 lb bbls ...lb.	.15	.16	.15	.16	.15	.16
Laurate, bbls ....lb.	...	.23	...	.23	...	.23
Linoleate, 80% anhyd, bbls ....lb.	...	.15	...	.15	...	.15
Naphthenate, bbls .....lb.	...	.17	...	.17	...	.17
Nitrate, tech, cks ......lb.	.036	.0385	.036	.0405	.038	.0405
Oleate, drs ....lb.	...	.15	...	.15	...	.15
Oxalate, neut, cryst, powd, bbls ....lb.	.19	.20	.19	.20	.19	.22½
Perchlorate, kgs ....lb.	...	.16	...	.16	...	.16
Persulfate, 112 lb kgs ..lb.	.21	.24	.21	.24	.21	.24
Phosphate, dibasic tech, powd, 325 lb bbls ...lb.	.07½	.10	.07½	.10	.07½	.10
Ricinoleate, bbls ......lb.	...	.15	...	.15	...	.15
Stearate, anhyd, bbls...lb.	...	.23	.23	.24	...	.24
Paste, bbls ....lb.	...	.08	.07½	.08	...	.07½

g Grain alcohol 25c a gal. higher in each case. **On a delv. basis.
z On a f.o.b. wks. basis.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Ammonium (continued):						
Sulfate, dom, f.o.b., bulk ton	...	26.75	26.50	28.00	26.50	28.50
Sulfocyanide, pure, kgs .lb.	...	.55	...	.55	...	.55
Amyl Acetate (from pentane) tks, delv ....lb.	...	.095	.095	.10	.10	.11½
c-l, drs, delv ....lb.	...	.105	.105	.11	...	...
lcl, drs, delv..........lb.	...	.115	.115	.112	...	...
tech, drs, delv ......lb.	...	.11½	.10½	.11½	.11	.10½
Secondary, tks, delv. .lb.	...	.08½	...	.08½	...	.08½
c-l, drs, delv ....lb.	...	.09½	...	.09½	...	.09½
tks, delv ....lb.	...	.08½	...	.08½	...	.08½
Chloride, norm, drs, wks lb.	.56	.68	.56	.68	.56	.68
mixed, drs, wks .....lb.	.0565	.0665	.0565	.077	.07	.077
tks, wks ....lb.	...	.0465	.0465	.06	...	.06
Mercaptan, drs, wks ...lb.	...	1.10	...	1.10	...	1.10
Oleate, lcl, wks, drs ...lb.	...	.25	...	.25	...	.25
Stearate, lcl, wks, drs..lb.	...	.26	...	.26	...	.26
Amylene, drs, wks ......lb.	.102	.11	.102	.11	.102	.11
tks, wks ..lb.	...	.09	...	.09	...	.09
Aniline Oil, 960 lb drs and tks ....lb.	.14½	.17½	.14½	.17½	.14½	.17½
Annatto fine ....lb.	.34	.37	.34	.37	.34	.37
Anthracene, 80% ......lb.	...	.55	.55	.75	...	.75
Anthraquinone, sublimed, 125 lb bbls ....lb.	...	.65	...	.65	...	.65
Antimony metal slabs, ton lots ....lb.	...	.12	.11¼	.12	.10¾	.14
Butter of, see Chloride.						
Chloride, soln cbys ....lb.	...	.17	...	.17	...	.17
Needle, powd, bbls ....lb.	.12	.13	.12	.14	.12½	.16
Oxide, 500 lb bbls .....lb.	.10	.10½	.10	.12½	.11½	.16½
Salt, 63% to 65%, tins lb.	.25¾	.27	.25¾	.27	.26	.27
Sulfuret, golden, bbls..lb.	.22	.23	.22	.23	.22	.23
Archil, conc, 600 lb bbls .lb.	.21	.27	.21	.27	.21	.27
Double, 600 lb bbls ....lb.	.18	.20	.18	.20	.18	.20
Aroclors, wks ....lb.	.18	.30	.18	.30	.18	.30
Arrowroot, bbls ....lb.	.08½	.09	.08½	.09	.08½	.09
Arsenic, Metal ....lb.	.40	.41	.40	.41	.40	.44
Red, 224 lb cs kgs ...lb.	...	.15¾	...	.15¾	...	.15¾
White, 112 lb kgs .....lb.	.03	.03¾	.03	.03¾	.03	.04

B

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Barium Carbonate precip, 200 lb bgs, wks ....ton	52.50	62.50	52.50	62.50	52.50	62.50
Nat (witherite) 90% gr, c-l, wks, bgs .....ton	41.00	43.00	41.00	43.00	41.00	44.00
Chlorate, 112 lb kgs, NY lb.	.16½	.17½	.16½	.17½	.16½	.17½
Chloride, 600 lb bbls, delv, zone 1 ....ton	77.00	92.00	77.00	92.00	77.00	.92.00
Dioxide, 88%, 690 lb drs lb.	.11	.12	.11	.12	.11	.12
Hydrate, 500 lb bbls ...lb.	.04½	.05	.04½	.05½	.04¾	.05½
Nitrate, bbls ....lb.	.06¾	.07¼	.06¾	.07¼	.06¾	.08¼
Barytes, floated, 350 lb bbls c-l, wks ....ton	...	.23.65	...	23.65	...	23.65
Bauxite, bulk, mines ....ton	7.00	10.00	7.00	10.00	7.00	10.00
Bentonite, c-l, 325 mesh, bgs, wks ....ton	...	16.00	...	16.00	...	16.00
200 mesh ....ton	...	11.00	...	11.00	...	11.00
Benzaldehyde, tech, 945 lb. drs, wks ....lb.	.60	.62	.60	.62	.60	.62
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd .gal.	...	.16	...	.16	...	.16
90% c-l, drs ....gal.	...	.21	...	.21	...	.21
Ind pure, tks, frt all'd gal.	...	.16	...	.16	...	.16
Benzidine Base, dry, 250 lb bbls ....lb.	.70	.72	.70	.72	.70	.72
Benzoyl Chloride, 500 lb drs lb.	.40	.45	.40	.45	.40	.45
Benzyl Chloride, 95-97% rfd, drs ....lb.	.30	.40	.30	.40	.30	.40
Tech, drs ....lb.	.25	.26	.25	.26	.25	.26
Beta-Naphthol, 250 lb bbls, wks ....lb.	.23	.24	.23	.24	.23	.24
Naphthylamine, sublimed, 200 lb bbls ....lb.	1.25	1.35	1.25	1.35	1.25	1.35
Tech, 200 lb bbls ....lb.	.51	.52	.51	.52	.51	.52
Bismuth metal ....lb.	1.10	1.15	1.05	1.15	1.00	1.10
Chloride, boxes ......lb.	3.20	3.25	3.20	3.25	3.20	3.25
Hydroxide, boxes .....lb.	3.15	3.20	3.15	3.20	3.15	3.20
Oxychloride, boxes .....lb.	...	2.95	...	2.95	...	2.95
Subbenzoate, boxes .....lb.	3.25	3.30	3.25	3.30	3.25	3.30
Subcarbonate, kgs .....lb.	1.43	1.46	1.43	1.56	1.13	1.58
Trioxide, powd, boxes .lb.	...	3.57	...	3.57	...	3.57
Subnitrate, fibre, drs ..lb.	1.23	1.26	1.23	1.36	1.03	1.48
Blanc Fixe, 400 lb bbls, wks ton *h*	40.00	75.00	40.00	75.00	40.00	75.00
Bleaching Powder, 800 lb drs, c-l, wks, contract 100 lb.	...	2.00	...	2.00	...	2.00
lcl, drs, wks ....lb.	2.25	3.60	2.25	3.60	2.25	3.60
Blood, dried, f.o.b., NY unit	...	2.50	2.50	3.50	2.50	3.25
Chicago, high grade ..unit	...	2.30	2.30	3.35	2.35	3.35
Imported shipt ......unit	...	2.70	2.65	3.00	2.90	3.45
Blues, Bronze Chinese Milori Prussian Soluble ....lb.	.36	.37	.36	.37	.36	.37
Ultramarine,* dry, wks, bbls .... lb.	...	.11	...	.11	...	.11
Regular grade, group 1 lb.	...	.16	...	.16	...	.16
Special, group 1 .....lb.	...	.19	...	.19	...	.19
Pulp, No. 1 ....lb.	...	.27	...	.27	...	.27
Bone, 4½ + 50% raw, Chicago ....ton	28.00	29.00	28.00	29.00	25.50	30.00
Bone Ash, 100 lb kgs .....lb.	.06	.07	.06	.07	.06	.07
Black, 200 lb bbls .....lb.	.06½	.08¼	.06½	.08¼	.06½	.08¼
Meal, 3% & 50%, imp ton	...	23.50	22.00	24.00	20.50	23.75
Domestic, bgs, Chicago ton	...	27.00	24.00	27.00	16.00	26.00
Borax, tech, gran, 80 ton lots, sacks, delv ....ton *i*	...	43.00	...	43.00	42.00	43.00
bbls, delv ....ton *i*	...	53.00	...	53.00	52.00	53.00

h Lowest price is for pulp, highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case; *Freight is equalized in each case with nearest producing point.

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180 MADISON AVE., NEW YORK, N.Y.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Borax (continued)						
Tech, powd, 80 ton lots, sacks ....ton ǰ	...	47.00	...	47.00	...	47.00
bbls, del ....ton ǰ	...	57.00	...	57.00	...	57.00
Bordeaux Mixture, drs ...lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases ....lb.	.30	.43	.30	.43	.30	.43
Bronze, Al, pwd, 300 lb drs lb.	.90½	.92½	.90½	.92½	.90½	.92½
Gold, blk ....lb.	.45	.65	.45	.65	.45	.65
Butanes, com 16-32° group 3 tks ....lb.	.02¼	.03¾	.02¼	.03¾	.02¼	.03¾
Butyl, Acetate, norm drs, frt allowed ....lb.	...	.08	.08	.09½	.09½	.10½
tks, frt allowed ....lb.	...	.07	.07	.08½	.08½	.09
Secondary, tks, frt allowed ....lb.	...	.05½	.05½	.06½	.06½	.07
drs, frt allowed ....lb.	.065	.07	.068	.08	.07½	.08½
Aldehyde, 50 gal drs, wks ....lb.	.15½	.17½	.15½	.17½	.16½	.17½
Carbinol, norm drs, wks lb.	.60	.75	.60	.75	.60	.75
Crotonate, norm, 55 and 110 gal drs, delv ....lb.	.75	1.00	.75	1.00	...	...
Lactate ....lb.	.22½	.23½	.22½	.23½	.22½	.23½
Oleate, drs. frt allowed lb.	...	.25	...	.25	...	.25
Propionate, drs ....lb.	.16½	.17	.16½	.18½	.18	.18½
tks, delv ....lb.	...	.15½	.15½	.17	...	.17
Stearate, 50 gal drs ...lb.	...	.26	...	.26	...	.26
Tartrate, drs ....lb.	.55	.60	.55	.60	.55	.60
Butyraldehyde, drs, lcl, wks lb.	...	.35½	...	.35½	...	.35½
C						
Cadmium Metal ....lb.	...	.55	.55	.85	.85	1.60
Sulfide, orange, boxes. lb.	.75	.85	.75	.90	.80	1.60
Calcium, Acetate, 150 lb bgs c-l, delv ....100 lb.	...	1.65	...	1.65	...	1.65
Arsenate, c-l, E. of Rockies. dealers, drs ....lb.	.06¾	.07¼	.06¾	.07¼	.06¾	.07¼
Carbide, drs ....lb.	.05	.06	.05	.06	.05	.06
Carbonate, tech, 100 lb bgs c-l ....lb.	...	1.00	...	1.00	...	1.00
Chloride, flake, 375 lb drs, burlap bgs, c-l, delv..ton	...	22.00	...	22.00	22.00	23.50
paper bgs, c-l, delv..ton	23.00	36.00	23.00	36.00	23.00	36.00
Solid, 650 lb drs, c-l, delv ....ton	...	20.00	...	20.00	20.00	21.50
Ferrocyanide, 350 lb bbls wks ....lb.	...	.17	...	.17	...	.17
Gluconate, Pharm, 125 lb bbls ....lb.	.50	.57	.50	.57	.50	.57
Levulinate, less than 25 bbl lots, wks ....lb.	...	3.00	...	3.00	...	3.00
Nitrate, 100 lb bgs ....ton	...	28.00	...	28.00	...	28.00
Palmitate, bbls ....lb.	.22	.23	.22	.23	.22	.23
Phosphate, tribasic, tech, 450 lb bbls ....lb.	.06½	.07½	.06½	.07½	.06½	.07½
Resinate, precip, bbls ..lb.	.13	.14	.13	.14	.13	.14
Stearate, 100 lb bbls ..lb.	.19	.21	.19	.21	.19	.21
Camphor, slabs ....lb.	.48	.48½	.48	.52½	.52	.56
Powder ....lb.	.47½	.48	.47½	.52½	.52	.56
Carbon Bisulfide, 500 lb drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Black, c-l, bgs, delv, price varying with zone† ..lb.	.02¾	.03¾	.02¾	.03¾	.027	.0380
lcl, bgs, f.o.b. whse ..lb.	...	.06¼	...	.06¼	.05¾	.06¼
cartons, f.o.b. whse ..lb.	...	.06¼	...	.06¼	...	.06¼
cases, f.o.b. whse ....lb.	...	.07	...	.07	...	.07
Decolorizing, drs, c-l ..lb.	.08	.15	.08	.15	.08	.15
Dioxide, Liq 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, 55 or 110 gal drs, c-l, delv lb.	.05	.05½	.05	.05½	.05	.06
Casein, Standard, Dom, grd lb.	.11	.14¼	.07	.14¼	.06½	.13½
80-100 mesh, c-l, bgs ..lb.	.11½	.14¾	.07½	.14¾	.07	.14
Castor Pomace, 5½ NH_3, c-l, bgs, wks ....ton	...	16.50	16.50	18.50	18.50	21.00
Imported, ship, bgs ....ton	...	18.00	18.00	20.00	20.00	21.00
Celluloid, Scraps, ivory cs lb.	.12	.15	.12	.15	.12	.15
Transparent, cs ....lb.	...	.20	...	.20	...	.20
Cellulose, Acetate, 50 lb kgs ....lb.	...	.35	.35	.36	.36	.40
Chalk, dropped, 175 lb bbls lb.	.02¾	.03¾	.02¾	.03¾	.02¾	.03¾
Precip, heavy, 560 lb cks lb.	.02¾	.03¼	.02¾	.03¼	.02¼	.04
Light, 250 lb cks ....lb.	.03¼	.04	.03¼	.04	.03¼	.04
Charcoal, Hardwood, lump, blk, wks ....bu.		.15	...	.15	...	.15
Softwood, bgs, delv* ..ton	25.00	36.00	23.00	36.00	23.00	34.00
Willow, powd, 100 lb bbls, wks ....lb.	.06	.07	.06	.07	.06	.07
Chestnut, clarified, tks, wks lb.	...	.01⅝	...	.01⅝	.01⅝	.02125
25%, bbls, wks ....lb.	...	.02	...	.02	.02	.0225
Pwd, 60%, 100 lb bgs, wks ....lb.	...	.04½		.04½	.04½	.04⅞
China Clay, c-l, blk mines ton	...	7.60	7.00	7.60	...	7.00
Imported, lump, blk ...ton	22.00	25.00	22.00	25.00	22.00	25.00
Chlorine, cyls, lcl, wks, contract ....lb.	.07½	.08½	.07½	.08½	.07½	.08½
cyls, c-l, contract ...lb. ǰ	...	.05¼	.05¼	.05½	...	.05½
Liq, tk, wks, contract 100 lb.	...	1.75	1.75	2.00	2.00	2.15
Multi, c-l, cyls, wks, cont ....lb.		1.90	1.90	2.15	2.30	2.55
Chloroacetophenone, tins, wks ....lb.	3.00	3.50	3.00	3.50	3.00	3.50
Chlorobenzene, Mono, 100 lb drs, lcl, wks ....lb.	.06	.07½	.06	.07½	.06	.07½
Chloroform, tech, 1000 lb drs ....lb.	.20	.21	.20	.21	.20	.21
USP, 25 lb tins ....lb.	.30	.31	.30	.31	.30	.31
Chloropicrin, comml cyls ..lb	...	.80	...	.80	...	.80
Chrome, Green, CP ....lb.	.21	.25	.21	.25	.21	.25
Yellow ....lb.	.14½	.15½	.14½	.15½	.14½	.15½

ǰ A delivered price; * Depends upon point of delivery; † New bulk price, tank cars ¼c per lb. less than bags in each zone.

Current

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Chromium Acetate, 8% Chrome, bbls ....lb.	.05	.08	.05	.08	.05	.08
Fluoride, powd, 400 lb bbl ....lb.	.27	.28	.27	.28	.27	.28
Coal tar, bbls ....bbl.	7.50	8.00	7.50	8.00	7.50	8.00
Cobalt Acetate, bbls .....lb.	.65	.67	.65	.67	.65	.68
Carbonate tech, bbls ...lb.	1.25	1.60	1.25	1.63	...	1.63
Hydrate, bbls ....lb.	...	1.78	...	1.78	1.36	1.78
Linoleate, solid, bbls...lb.	...	.33	...	.33	...	.33
paste, 6%, drs ......lb.	...	.31	...	.31	...	.31
Oxide, black, bgs ......lb.	...	1.67	...	1.67	...	1.67
Resinate, fused, bbls...lb.	...	.13½	...	.13½	...	.13½
Precipitated, bbls ....lb.	...	.34	...	.34	...	.34
Cochineal, gray or bk bgs lb.	.35	.38	.35	.38	.35	.38
Teneriffe silver, bgs ...lb.	.36	.39	.36	.39	.36	.39
Copper, metal, electrol 100 lb.	...	10.25	10.00	11.25	9.00	11.25
Acetate, normal, bbls, wks ....lb.	.21	.23	.21	.23	.21	.23
Carbonate, 400 lb bbls..lb.	.10½	.11½	.10½	.11½	.10¼	.11½
52-54% bbls ....lb.	.14½	.15½	.14½	.15½	.1340	.16¾
Chloride, 250 lb bbls...lb.	.12½	.13½	.12½	.14	.12½	.17
Cyanide, 100 lb drs ...lb.	...	.34	...	.34	.34	.38
Oleate, precip, bbls ....lb.	...	.20	...	.20	...	.20
Oxide, black, bbls, wks lb.	.15	.16	.15	.17¾	.13½	.17¾
red 100 lb bbls ......lb.	.15¾	.16¾	.15¾	.17¾	.15	.19775
Sub-acetate verdigris, 400 lb bbls ....lb.	.18	.19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.	...	4.25	4.10	4.50	4.00	4.50
Copperas, crys and sugar bulk c-l, wks ....ton	...	14.00	...	14.00	12.00	14.00
Corn Sugar, tanners, bbls 100 lb.	...	2.89	2.89	3.19	2.95	3.30
Corn Syrup, 42°, bbls 100 lb.	...	2.92	2.92	3.12	2.89	3.16
43°, bbls ....100 lb.	...	2.97	2.97	3.17	2.94	3.21
Cotton, Soluble, wet, 100 lb bbls ....lb.	.40	.42	.40	.42	.40	.42
Cream Tartar, powd & gran 300 lb bbls ....lb.	.22¼	.22¾	.22¼	.23¼	.19¾	.23¼
Creosote, USP, 42 lb cbys lb.	.45	.47	.45	.47	.45	.47
Oil, Grade 1 tks .....gal.	.13½	.14	.13½	.14	.13½	.14
Grade 2 ....gal.	.122	.132	.122	.132	.122	.132
Cresol, USP, drs ....lb.	.09½	.10	.09½	.10½	.10	.12½
Crotonaldehyde, 97%, 55 and 110 gal drs, wks ....lb.	.11	.12	.11	.22*	.22*	.30*
Cutch, Philippine, 100 lb bale lb.	...	.04	.04	.04½	.04	.06
Cyanamid, pulv, bags c-l, frt all'w'd, nitrogen basis, unit	...	1.27½	...	...	...	...
D						
Derris root 5% rotenone, bbls ....lb.	.24	.30	.24	.30	.34	.43
Dextrin, corn, 140 lb bgs f.o.b., Chicago ...100 lb.	3.30	3.50	3.30	3.70	3.30	3.75
British Gum, bgs ...100 lb.	3.55	3.65	3.55	3.95	3.55	4.00
Potato, Yellow, 220 lb bgs lb.	.07	.07¾	.07	.08¾	.07¼	.08¾
White, 220 lb bgs, lcl lb.	.08	.09	.08	.09	.08	.09
Tapioca, 200 bgs, lcl ...lb.	...	.0715	...	.0715	.0715	.08
White, 140 lb bgs ..100 lb.	3.25	3.45	3.25	3.55	3.30	3.70
Diamylamine, c-l, drs, wks lb.	...	.47	...	.47	.47	.75
l.c.l. drs, wks........lb.	.48	.50	...	...	...	...
tks, wks ....lb.	...	.45	...	...	...	...
Diamylene, drs, wks .....lb.	.095	.102	.095	.102	.095	.102
tks, wks ....lb.	...	.08½	...	.08½	...	.08½
Diamylether, wks, drs ...lb.	.085	.092	.085	.092	.085	.092
tks, wks ....lb.	...	.075	...	.075	...	.075
Oxalate, lcl, drs, wks..lb.	...	.30	...	.30	...	.30
Diamylphthalate, drs, wks lb.	.21	.21½	.19	.21	.19	.21
Diamyl Sulfide, drs, wks..lb.	...	1.10	...	1.10	...	1.10
Diatomaceous Earth, see Kieselguhr.						
Dibutoxy Ethyl Phthalate, drs, wks ....lb.	...	.35	...	.35	...	.35
Dibutylamine, lcl, drs, wks lb.	.51	.53	.51	.55	...	.55
c.l. drs, wks ....lb.	...	.50	...	...	...	...
tks, wks ....lb.	...	.48	...	...	...	...
Dibutyl Ether, drs, wks, lcl lb.	.24½	.25	.24½	.25	.25	.30
Dibutylphthalate, drs, wks, frt all'd ....lb.	.19	.19½	.19	.19½	.19	.21
Dibutyltartrate, 50 gal drs lb.	...	.50	.45	.54	.45	.54
Dichlorethylene, drs .....lb.	...	.25	...	.25	...	.25
Dichloroethylether, 50 gal drs, wks ....lb.	.15	.16	.15	.16	.15	.16
tks, wks ....lb.	...	.14	...	.14	...	.14
Dichloromethane, drs, wks lb.	...	.23	...	.23	...	.23
Dichloropentanes, drs, wks lb.	no prices		no prices		...	...
tks, wks ....lb.	no prices		no prices		...	...
Diethanolamine, tks, wks..lb.	...	.23	...	.23	...	.23
Diethylamine, 400 lb drs..lb.	2.75	3.00	2.75	3.00	2.75	3.00
Diethylaniline, 850 lb drs lb.	.40	.52	.40	.52	.40	.50
Diethyl Carbinol, drs.....lb.	.60	.75	.60	.75	.60	.75
Diethylcarbonate, com drs lb.	.31¾	.35	.31¾	.35	.31¾	.35
Diethylorthotoluidin, drs ..lb.	.64	.67	.64	.67	.64	.67
Diethylphthalate, 1000 lb drs lb.	.19	.19½	.19	.19½	.19	.19½
Diethylsulfate, tech, drs, wks, lcl ....lb.	.13	.14	.13	.14	.13	.14
Diethyleneglycol, drs ....lb.	.16	.17	.16	.17	.16	.17
Mono ethyl ethers, drs..lb.	.15	.16	.15	.16	.15	.16
tks, wks ....lb.	...	.14	...	.14	...	.14
Mono butyl ether, drs..lb.	.23	.24	.23	.24	.23	.24
tks, wks ....lb.	...	.22	...	.22	...	.22
Diethylene oxide, 50 gal drs, wks ....lb.	.20	.24	.20	.24	.20	.24
Diglycol Laurate, bbls ...lb.	.16	.17	.16	.23	...	.27½
Oleate, bbls ....lb.	...	.13	.13	.20	...	.21
Stearate, bbls ....lb.	...	.20	.20	.28	...	.27½
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis ....lb.	...	1.00	...	1.00	...	1.00
Dimethylaniline, 340 lb drs lb.	.23	.24	.23	.24	.23	.27
Dimethyl Ethyl Carbinol, drs lb.	.60	.75	.60	.75	.60	.75

k Higher price is for purified material; * These prices were on a delivered basis.

Prices

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Dimethyl phthalate, drs, wks, frt allowed ....lb.	...	.19	...	.19	...	.19
Dimethylsulfate, 100 lb drs lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls lb. k	.18	.19	.16	.19	.16	.19
Dinitrochlorobenzene, 400 lb bbls ....lb.	...	.14	.13½	.14	.13½	.14
Dinitronaphthalene, 350 lb bbls ....lb.	.35	.38	.35	.38	.35	.38
Dinitrophenol, 350 lb bbls lb.	.22	.23	.22	.24	.23	.24
Dinitrotoluene, 300 lb bbls lb.	...	.15½	...	.15½	...	.15½
Diphenyl, bbls ....lb.	.15	.25	.15	.25	.15	.25
Diphenylamine ....lb.	.31	.32	.32	.32	.31	.32
Diphenylguanidine, 100 lb drs ....lb.	.35	.37	.31	.37	.31	.32
Dip Oil, see Tar Acid Oil.						
Divi Divi pods, bgs shipmt ton	...	nom.	...	nom.	...	nom.
Extract ....lb.	.05¾	.06¾	.05¾	.06¾	.05	.06¾
E						
Egg Yolk, dom., 200 lb cases lb.	.59	.62	.59	.69	.60	.69
Epsom Salt, tech, 300 lb bbls c-l, NY ....100 lb.	1.90	2.10	1.90	2.10	1.90	2.10
USP, c-l, bbls .....100 lb.	...	2.10	...	2.10	...	2.10
Ether, USP anaesthesia 55 lb drs ....lb.	.22	.23	.22	.23	.22	.23
(Conc) ....lb.	.09	.10	.09	.10	.09	.10
Isopropyl 50 gal drs ...lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed ......lb.	...	.06	...	.06	...	.06
Nitrous conc bottles ...lb.	...	.68	...	.68	...	.68
Synthetic, wks, drs ...lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester tks, frt all'd ....lb.	...	.051	...	.051	.051	.05½
drs, frt all'd ....lb.	...	.061	...	.061	.061	.06½
99%, tks, frt all'd ...lb.	...	.0585	...	.0585	.0585	.06¾
drs, frt all'd ....lb.	...	.0685	...	.0685	.0685	.07¾
Acetoacetate, 110 gal drs lb.	...	.27½	...	.27½	...	.27½
Benzylaniline, 300 lb drs lb.	.86	.88	.86	.88	.86	.88
Bromide, tech, drs .....lb.	.50	.55	.50	.55	.50	.55
Cellullose, drs, wks, frt all'd ....lb.	.45	.50	.45	.50	.45	1.00
Chloride, 200 lb drs ...lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate, cbys ..lb.	...	.30	...	.30	...	.30
Crotonate, drs ....lb.	.75	1.00	.75	1.25	1.00	1.25
Formate, drs, frt all'd..lb.	.27	.28	.27	.28	.27	.28
Lactate, drs, wks ......lb.	...	.33	...	.33	...	.33
Oxalate, drs, wks .....lb.	.30	.34	.30	.34	.30	.34
Oxybutyrate, 50 gal drs, wks ....lb.	.30	.30½	.30	.30½	.30	.30½
Silicate, drs, wks ......lb.	...	.77	...	.77	...	.77
Ethylene Dibromide, 60 lb drs ....lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont ....lb.	.75	.85	.75	.85	.75	.85
Anhydrous ....lb.	...	.75	...	.75	...	.75
Dichloride, 50 gal drs, wks lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks..lb.	.16	.20	.16	.21	.17	.21
tks, wks ....lb.	...	.15	.15	.16	...	.16
Mono Butyl Ether, drs, wks ....lb.	.18	.22	.18	.22	.20	.21
tks, wks ....lb.	...	.17	.17	.19	...	.19
Mono Ethyl Ether, drs, wks ....lb.	.15	.16	.15	.17	.16	.17
tks, wks ....lb.	...	.14	...	.15	...	.15
Mono Ethyl Ether Acetate, drs, wks .....lb.	.13	.14	.13	.14	...	.14
tks, wks ....lb.	...	.12	.12	.13	...	.13
Mono Methyl Ether, drs wks ....lb.	.17	.18	.17	.22	.18	.22
tks, wks ....lb.	...	.16	...	.17	...	.17
Oxide, cyl ....lb.	.50	.55	.50	.55	.50	.55
Ethylideneaniline ....lb.	.45	.47½	.45	.47½	.45	.47½
F						
Feldspar, blk pottery ....ton	17.00	19.00	17.00	19.00	17.00	19.00
Powd, blk, wks .....ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls ....lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys ....lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground wks ....unit l	...	3.35	3.00	3.35	2.75	3.30
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis .... unit m	...	2.35	2.35	2.50	2.50	2.50
Fluorspar, 98% bgs .....lb.	30.00	31.60	30.00	33.00	...	33.00
Formaldehyde, USP, 400 lb bbls, wks ....lb.	.05¾	.06¼	.05¾	.06¼	.05¾	.06¼
Fossil Flour ....lb.	.02½	.04	.02½	.04	.02½	.04
Fullers Earth, blk, mines ton	10.00	11.00	10.00	11.00	10.00	11.00
Imp powd, c-l, bgs ...ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb. drs ....lb.	...	.30	...	.30	...	.30
Fusel Oil, 10% impurities lb.	.12½	.14	.12½	.14	.12½	.14
Fustic, crystals, 100 lb boxes ....lb.	.22	.26	.22	.26	.22	.26
Liquid 50°, 600 lb bbls lb.	.09½	.13	.09½	.13	.09½	.13
Solid, 50 lb boxes ......lb.	.17½	.19½	.17½	.19½	.17½	.19½
G						
G Salt paste, 360 lb bbls..lb.	.45	.47	.45	.47	.45	.47
Gambier, com 200 lb bgs lb.	.06¾	.07¾	.06¾	.07¾	.06¾	.07¾
Singapore cubes, 150 lb bgs ....100 lb.	.08	.09	.08	.09½	.08½	.11
Gelatine, tech, 100 lb cs ..lb.	.42	.43	.42	.50	.45	.50
Glauber's Salt, tech, c-l, bgs, wks* ....100 lb.	.95	1.15	.95	1.15	.95	1.15
Anhydrous, see Sodium Sulfate						

l + 10; *m* + 50; * Bbls. are 20c higher.

Current

Glue, Bone
Hemlock

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Glue, bone, com grades, c-l bgs ....lb.	.11½	.13½	.11½	.13½	.13	.16½
Better grades, c-l, bgs lb.	.15	.16½	.15	.16½	.14½	.16½
Glycerin, CP, 550 lb drs lb.	...	.12½	...	.12½	.12½	.16
Dynamite, 100 lb drs..lb.	...	nom.	...	.09	.12¾	.16
Saponification, drs ....lb.	.09	.10	.08½	.10	.08½	.11¼
Soap Lye, drs ....lb.	.07¾	.07⅞	.07½	.07⅞	.07½	.10¼
Glyceryl Bori-Borate, bbls lb.	...	.40	...	.40	...	.40
Monoricinoleate, bbls ..lb.	...	.27	...	.27	...	.27
Monostearate, bbls ....lb.	...	.30	...	.30	...	.30
Oleate, bbls ....lb.	...	.22	...	.22	...	.22
Phthalate ....lb.	...	.37	...	.37	...	.37
Glyceryl Stearate, bbls ...lb.	...	.18	...	.18	...	.18
Glycol Bori-Borate, bbls..lb.	...	.22	.22	.23	...	.26
Phthalate, drs ....lb.	...	.38	.38	.40	...	.40
Stearate, drs ....lb.	...	.24	.24	.27½	...	.27½
GUMS						
Gum Aloes, Barbadoes ...lb.	.85	.90	.85	.90	.85	.90
Arabic, amber sorts ...lb.	.10¼	.10¾	.09	.11	.09	.12
White sorts, No. 1, bgs lb.	23	.24	.23	.24	.23	.28
No. 2, bgs ....lb.	21	.22	.21	.22	.21	.26
Powd, bbls ....lb.	.12½	.13⅜	.12½	.14	.12	.16
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b., NY ....lb.	.02½	.10½	.02½	.10½	.02½	.10½
California, f.o.b. NY, drs ton	29.00	55.00	29.00	55.00	29.00	55.00
Egyptian, 200 lb cases, f.o.b. NY ....lb.	.12	.15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120 lb cases ....lb.	.17	.18	.17	.21	.15	.25
Copal, Congo, 112 lb bgs, clean, opaque ....lb.	...	.18¼	.18¼	.18¾	.18¾	.19¼
Dark amber ....lb.	...	.07⅛	...	.07⅛	.07⅛	.08⅞
Light amber ....lb.	...	.11¼	...	.11¼	.11¼	.13¼
Copal, East India, 180 lb bgs						
Macassar pale bold ...lb.	...	.11⅜	...	.11⅜	.11⅜	.13
Chips ....lb.	...	.05⅜	...	.05⅜	...	.05⅜
Dust ....lb.	...	.03¾	.03¼	.04	.03½	.04⅛
Nubs ....lb.	...	.09½	...	.09½	.09⅛	.10⅜
Singapore, Bold ....lb.	...	.14	.14	.14½	.14½	.15¼
Chips ....lb.	...	.05⅞	.05⅝	.06½	.04¾	.05⅜
Dust ....lb.	...	.03¾	.03¼	.04	.03¼	.04⅛
Nubs ....lb.	...	.09⅝	.09⅝	.10	.10	.10⅜
Copal Manila, 180-190 lb baskets, Loba A ....lb.	...	.10½	.10½	.11	.10½	.12
Loba B ....lb.	...	.10⅛	.09¾	.10¾	.10¼	.11⅝
Loba C ....lb.	...	.09¾	.09	.10⅜	.09¾	.11¼
DBB ....lb.	...	.07⅞	.07⅞	.08¼	.07⅞	.08¾
Dust ....lb.	...	.05¼	.05⅛	.05½	.05⅛	.06⅝
MA sorts ....lb.	...	.06⅛	.05⅞	.06⅜	.05⅞	.07¼
Copal Pontianak, 224 lb cases, bold genuine ....lb.	...	.15¼	...	.15¼	.15¼	.16½
Chips ....lb.	...	.07⅛	.07⅛	.08¼	.08¼	.10¼
Mixed ....lb.	...	.13⅜	.13⅜	.14	...	.14
Nubs ....lb.	...	.10½	.10½	.11⅜	.11⅜	.12⅞
Split ....lb.	...	.12	.12	.13½	.13½	.13⅞
Damar Batavia, 136 lb cases						
A ....lb.	...	.20	...	.20	.20	.25½
B ....lb.	...	.18½		.18½	.18½	.24
C ....lb.	...	.14⅛	.14⅛	.14⅞	.14⅞	.20⅜
D ....lb.	...	.12¼	.12¼	.13½	.13⅛	.17½
A/D ....lb.	...	.13⅛	.13⅛	.14½	.14½	.20⅜
A/E ....lb.	...	.11⅜	.11⅜	.12¼	.12¼	.17¼
E ....lb.	...	.07⅜	...	.07⅜	.07⅜	.08½
F ....lb.	...	.07¼	...	.07¼	...	.07¼
Singapore, No. 1 ....lb.	...	.13⅝	.13¼	.15¼	.15¼	.21⅛
No. 2 ....lb.	...	.10⅞	.10½	.11¼	.10⅜	.15⅜
No. 3 ....lb.	...	.05⅜	.05¼	.05⅝	.05	.05¾
Chips ....lb.	...	.09¼	...	.09¼	.09¼	.13½
Dust ....lb.	...	.05⅝	.05¼	.05⅝	.05	.05¾
Seeds ....lb.	...	.07⅜	...	.07⅜	.07⅜	.09½
Elemi, cns, c-l, ...lb.	...	.08⅛	...	.08⅛	.08⅛	.09½
Ester ....lb.	.06¼	.07	.06	.07	.06¼	.08½
Gamboge, pipe, cases ....lb.	.55	.60	.55	.60	.60	.80
Powd, bbls ....lb.	.60	.65	.60	.65	.65	.85
Ghatti, sol. bgs ....lb.	.11	.15	.11	.15	.11	.15
Karaya, bbls, bxs, drs,...lb.	.14	.23	.14	.23	...	...
Kauri, NY						
Brown XXX, cases ....lb.	.60	.60½	.60	.60½	.60	.60½
BX ....lb.	...	.38	...	.38	...	.38
B1 ....lb.	...	.28	...	.28	...	.28
B2 ....lb.	...	.24	...	.24	...	.24
B3 ....lb.	...	.18½	...	.18½	...	.18½
Pale XXX ....lb.	...	.61	...	.61	...	.61
No. 1 ....lb.	...	.41	...	.41	...	.41
No. 2 ....lb.	...	.24	...	.24	...	.24
No. 3 ....lb.	...	.17¾	...	.17¾	...	.17¾
Kino, tins ....lb.	3.50	nom.	2.50	3.50	2.00	2.75
Mastic ....lb.	.55	.56	.55	.56	.55	.56
Sandarac, prime quality, 200 lb bgs & 300 lb cks..lb.	...	.23	.15	.23	.19	.26
Senegal, picked bags ....lb.	.25	.27	.25	.27	.23	.27
Sorts ....lb.	.10¼	.10¾	.09¼	.10¾	.09¼	.12
Thus, bbls ....280 lbs.	14.50	14.75	13.50	14.75	13.50	14.25
Tragacanth, No. 1, cases .lb.	2.25	2.35	2.25	2.45	2.40	3.00
No. 2 ....lb.	1.90	1.95	1.90	2.35	2.30	2.75
No. 3 ....lb.	1.60	1.65	1.60	1.95	1.90	2.70
Yacca, bgs ....lb.	.03½	.04½	.03½	.04½	.03½	.04½
H						
Helium, cyl (200 cu. ft.) cyl.	...	25.00	...	25.00	...	25.00
Hematine crystals, 400 lb bbls lb.	.18	.34	.18	.34	.18	.34
Hemlock, 25%, 600 lb bbls.						
wks ....lb.	.03	.03¼	.03	.03¼	.03	.03¼
tks ....lb.	...	.02⅝	...	.02⅝	.02⅝	.02¾

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Hexalene, 50 gal drs, wks lb.	...	.30	...	.30	...	.30
Hexane, normal 60-70° C. Group 3, tks ......gal.	...	.10½	...	.10½	...	.10½
Hexamethylenetetramine, powd, drs ....lb.	.32	.33	.32	.36	.35	.36
Hexyl Acetate, secondary, delv, drs ....lb.	.13	.13½	.13	.13½	.13	.13½
tks ....lb.	...	.12		.12		.12
Hoof Meal, f.o.b. Chicago unit	...	2.50	2.50	2.85	2.35	3.35
Hydrogen Peroxide, 100 vol, 140 lb cbys ....lb.	.19½	.20	.19½	.20	.19½	.20
Hydroxylamine Hydrochloride ....lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls lb.	.13	.16	.13	.21	.16	.21
I						
Indigo, Bengal, bbls .....lb.	...	2.40	...	2.40	...	2.40
Synthetic, liquid ......lb.	.16½	.19	.16½	.19	.16½	.19
Iodine, Resublimed, jars .lb.	...	1.75	...	1.75	1.50	1.75
Irish Moss, ord, bales ...lb.	.10	.11	.10	.11	.10	.11
Bleached, prime, bales lb.	.19	.20	.19	.20	.19	.20
Iron Acetate Liq. 17°, bbls delv ....lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.						
Nitrate, coml, bbls...100 lb.	2.32	3.11	2.32	3.11	2.32	3.11
Isobutyl Carbinol (128-132° C) drs, wks ....lb.	.33	.34	.33	.34	.33	.34
tks, wks ....lb.	...	.32	...	.32	...	.32
Isopropyl Acetate, tks, frt all'd ....lb.	...	.0510	...	.0510	.0510	.05½
drs, frt all'd ......lb.	.061	.066	.061	.066	.061	.07
Ether, see Ether, isopropyl.						
Keiselguhr, dom bags, c-l, Pacific Coast ....ton	22.00	85.00	22.00	85.00	22.00	85.00
L						
Lead Acetate, f.o.b. NY, bbls, White, broken ......lb.	...	.10	...	.10	.10	.11
cryst, bbls ....lb.	...	.10	...	.10	.10	.11
gran, bbls ....lb.	...	.10¾	...	.10¾	.10¾	.11¾
powd, bbls ....lb.	...	.10¾	...	.10¾	.10¾	.11¾
Arsenate, East, drs ...lb.	.10	.10¼	.10	.11½	.11	.13½
Linoleate, solid, bbls...lb.		.19		.19	...	.19
Metal, c-l, NY .....100 lb.	4.85	4.90	4.75	5.10	4.00	5.10
Nitrate, 500 lb bbls, wks lb.	.10	.11½	.10	.11½	.10	.11½
Oleate, bbls ....lb.	.18½	.20	.18½	.20	.18½	.20
Red, dry, 95% Pb_3O_4, delv ....lb.	...	.0735	.07¼	.08	.06½	.08
97% Pb_3O_4, delv ...lb.	...	.076	.07½	.076	.06¾	.081
98% Pb_3O_4, delv ...lb.	...	.0785	.07¾	.0785	.07	.0835
Resinate, precip, bbls ..lb.	...	.16½		.16½		.16½
Stearate, bbls ....lb.	...	.25	.22	.25	.22	.23
Titanate, bbls, c-l, f.o.b. wks, frt all'd ......lb.	.11	.11½	.11	.11½	.11	.11½
White, 500 lb bbls, wks lb.	...	.07	...	.07	.06	.07
Basic sulfate, 500 lb bbls, wks ....lb.	...	.06¼	...	.06¼	.05¼	.06¼
Lime, chemical quicklime, f.o.b., wks, bulk ...ton	7.00	8.00	7.00	8.00	7.00	8.00
Hydrated, f.o.b. wks...ton	8.50	12.00	8.50	12.00	8.50	12.00
Lime Salts, see Calcium Salts						
Lime sulfur, dealers, tks..gal.	.08	.11½	.08	.11½	.08	.11½
drs ....gal.	.11	.16	.11	.16	.11	.16
Linseed Meal, bgs ......ton	...	37.50	37.50	42.00	39.00	45.00
Litharge, coml, delv, bbls.lb.	...	.0635	.06¼	.0635	.05½	.066
Lithopone, dom, ordinary, delv, bgs ....lb.	...	.03¾	.03¾	.04⅛	.04⅛	.04⅝
bbls ....lb.	...	.04	.04	.04⅜	.04⅜	.04⅞
High strength, bgs ....lb.	...	.05¼	.05¼	.05⅝	.05⅝	.06⅛
bbls ....lb.	...	.05½	.05½	.05⅞	.05⅞	.06⅜
Titanated, bgs ....lb.	...	.05¼	.05¼	.05⅝	.05⅝	.06⅛
bbls ....lb.	...	.05½	.05½	.05⅞	.05⅞	.06⅜
Logwood, 51°, 600 lb bbls lb.	.09½	.11½	.09½	.11½	.09½	.11½
Solid, 50 lb boxes .....lb.	.15	.19	.15	.19	.15	.19
Sticks ....ton	24.00	25.00	24.00	25.00	24.00	25.00
M						
Madder, Dutch ....lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbls ton	60.00	65.00	60.00	65.00	60.00	65.00
Magnesium Carb, tech, 70 lb bgs, wks ....lb.	...	.06¼	.05¾	.06½	.05¾	.07
Chloride flake, 375 lb drs, c-l, wks ....ton	39.00	42.00	39.00	42.00	39.00	42.00
Fluosilicate, crys, 400 lb bbls, wks ....lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, calc tech, heavy bbls, frt all'd .....lb.	.25	.30	.25	.30	.25½	.30½
Light, bbls above basis lb.	.20	.25	.20	.25	.20	.25½
USP Heavy, bbls, above basis ....lb.	.25	.30	.25	.30	.25	.30½
Palmitate, bbls ....lb.	.33	nom.	.33	nom.		.33
Silicofluoride, bbls ...lb.	.09½	.10½	.09½	.10½	.09½	.10½
Stearate, bbls ....lb.	.21	.24	.21	.24	.21	.24
Manganese acetate, drs...lb.	...	.26½	...	.26½	...	.26½
Borate, 30%, 200 lb bbls lb.	.15	.16	.15	.16	.15	.16
Chloride, 600 lb cks ...lb.	.08¼	.08¾	.07½	.12	.09	.12
Dioxide, tech (peroxide), paper bags, c-l ......ton	...	47.50	...	47.50	47.50	62.50
Hydrate, bbls ....lb.	...	.32	...	.32	...	.32
Linoleate, liq, drs .....lb.	.18	.19¼	.18	.19¼	.18	.19¼
solid, precip, bbls ...lb.	...	.19	...	.19	...	.19
Resinate, fused, bbls...lb	.08¼	.08½	.08¼	.08½	.08¼	.08½
precip, drs ....lb.	...	.12	...	.12	...	.12
Sulfate, tech, anhyd, 90-95%, 550 lb drs ...lb.	.07	.07½	.07	.07½	.07	.07½

Current

Mangrove
Octyl Acetate

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Mangrove, 55%, 400 lb bbls lb.	...	.04	...	.04	...	.04
Bark, African ....ton	...	25.25	23.00	26.00	23.00	24.50
Mannitol, pure cryst, cs,wks lb.	.95	1.00	.95	1.20	1.15	1.45
commercial grd, 250 lb bbl ....lb.	.42	.50	.42	.57	...	...
Marble Flour, blk ......ton	12.00	13.00	12.00	13.00	12.00	13.00
Mercury chloride(Calomel) lb.	...	1.52	1.36	1.52	1.18	1.59
Mercury metal...76 lb. flasks	...	86.00	80.00	97.00	73.00	84.50
Mesityl Oxide, f.o.b. dest., tks. ....lb.	...	.10½	.10½	.20	...	...
drs, c.l. ....lb.	...	.11½	.11½	.21	...	...
drs, l.c.l. ....lb.	...	.12	.12	.21½	...	...
Meta-nitro-aniline ....lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls ....lb.	1.30	1.40	1.30	1.55	1.45	1.55
Meta-phenylene diamine 300 lb bbls ....lb.	.80	.84	.80	.84	.80	.84
Meta-toluene-diamine 300 lb bbls ....lb.	.65	.67	.65	.67	.65	.67
Methanol, denat, grd, drs, c-l, frt all'd ....gal.	...	.46	.41	.46	.30	.41
tks, frt all'd ....gal.	...	.40	.35	.40	.25	.35
Pure, drs, c-l, frt all'd gal.	...	.38	...	.38	...	.38
tks ....gal.	...	.33	...	.33	...	.33
95%, tks ....gal.	...	.31	...	.31	...	.31
97%, tks ....gal.	...	.32	...	.32	...	.32
Methyl Acetate, tech, tks, delv ....lb.	...	.06	.06	.06½	...	.06½
55 gal drs, delv .....lb.	.07	.08	.07	.08	.07½	.08
C.P. 97-99%, tks, delv lb.	...	.06¼	...	.06¼	.06¼	.07
55 gal drs, delv ....lb.	.07¼	.07¾	.07¼	.07¾	.07¼	.08½
Acetone, frt all'd, drs gal. *p*	.33	.39	.30	.39	.30	.40½
tks, frt all'd, drs ..gal. *p*	...	.28	.25	.29	.25	.32½
Synthetic, frt all'd, east of Rocky M., drs ....gal. *p*	.38	.41	.38	.41	.38	.51
tks, frt all'd ...gal.	...	.31½	...	.31½	.31½	.39½
West of Rocky M., frt all'd, drs ..gal. *p*	...	.42	...	.42	.42	.46
tks, frt all'd...gal. *p*	...	.35	...	.35	.35	.39½
Anthraquinone ....lb.	...	.83	...	.83	...	.83
Butyl Ketone, tks .....lb.	...	.10½	...	.10½	...	.10½
Chloride, 90 lb cyl .....lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd lb.	...	.05	...	.05	.05	.06
50 gal drs, frt all'd c-l lb.	...	.06	...	.06	.06	.07
Formate, drs, frt all'd..lb.	.35	.36	.35	.36	.35	.36
Hexyl Ketone, pure, drs lb.	...	.60	...	.60	...	.60
Lactate, drs, frt all'd ..lb.	...	.30	...	.30	...	.30
Mica, dry grd, bgs, wks ..lb.	...	30.00	...	30.00	30.00	35.00
Michler's Ketone, kgs....lb.	...	2.50	...	2.50	...	2.50
Monoamylamine, c-l,drs,wks lb.	...	.52	...	.52	.52	1.00
l.c.l. drs, wks ....lb.	.53	.55	...	...	...	...
tks, wks ....lb.	...	.50	...	...	...	...
Monobutylamine, drs, c.l.-l.c.l. wks ......lb.	.50	.53	.50	.65	...	.65
tks, wks ....lb.	...	.48	...	...	...	...
Monochlorobenzene, see Chlorobenzene, mono						
Monoethanolamine, tks, wks lb.	...	.23	...	.23	...	.23
Monomethylamine, drs, frt all'd, E. Mississippi, c-l lb.	...	.65	...	.65	...	.65
Monomethylparaminosulfate, 100 lb drs ....lb.	3.75	4.00	3.75	4.00	3.75	4.00
Morpholine, drs 55 gal, lcl wks ....lb.		.75	...	...	...	...
Myrobalans 25%, liq bbls lb.	.03¾	.04¼	.03¾	.04¼	.03¾	.04¼
50% Solid, 50 lb boxes lb.	.04⅛	.05	.04¼	.05	.04⅜	.06¼
J1 bgs ....ton	...	26.00	24.00	26.00	23.50	30.00
J2 bgs ....ton	...	20.00	19.00	20.00	17.00	22.00
R2 bgs ....ton	...	16.75	16.75	17.25	17.00	22.00
N						
Naphtha, v.m.&p. (deodorized) see petroleum solvents.						
Naphtha, Solvent, water-white, tks ....gal.	...	.26	...	.26	.26	.31
drs, c-l ....gal.	...	.31	...	.31	.31	.36
Naphthalene, dom, crude bgs, wks ....lb.	2.25	2.85	2.25	2.85	2.25	2.85
Imported, cif, bgs ...lb.	...	1.60	1.50	1.85	1.40	2.25
Balls, flakes, pks ......lb.	...	.06½	...	.06½	.06½	.08
Balls, ref'd, bbls, wks ..lb.	...	.05¾	...	.05¾	.05¾	.07¼
Flakes, ref'd, bbls, wks lb.	...	.05¾	...	.05¾	.05¾	.07¼
Nickel Carbonate, bbls ..lb.	.36	.37½	.36	.37½	.36	.37½
Chloride, bbls ....lb.	.18	.20	.18	.20	.18	.20
Metal ingot ....lb.	...	.35	...	.35	...	.35
Oxide, 100 lb kgs, NY lb.	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY .lb.	.13	.13½	.13	.13½	.13	.13½
Single, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs ....lb.	...	.70	.70	.76	...	.76
Nitre Cake, blk ....ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, redistilled, 1000 lb drs, wks ....lb.	.08	.10	.08	.10	.08	.10
tks ....lb.		.07	.07	.07½	...	.07½
Nitrocellulose, c-l, l-c-l, wks lb.	.22	.29	.22	.29	.22	.29
Nitrogen Sol. 45½% ammon., f.o.b. Atlantic & Gulf ports. tks, unit ton	...	1.04	...	1.04	1.01	1.04
Nitrogenous Mat'l, bgs, imp unit	...	2.50	2.40	2.50	2.35	2.65
dom, Eastern wks ...unit	...	2.30	2.30	2.50	2.50	2.75
dom, Western wks ...unit	...	1.90	1.90	2.25	2.20	2.35
Nitronaphthalene, 550 lb bbls lb.	.24	.25	.24	.25	.24	.25
Nutgalls Alleppo, bgs ....lb.	...	.23	.22	.23	.23	.23
O						
Oak Bark Extract, 25%, bbls lb.	...	.03½	.03⅛	.03½	...	.03⅛
tks ....lb.	...	.02¾	...	.02¾	...	.02¾
Octyl Acetate, tks, wks ...lb.	...	.15	.15	.17	.16	.17

a Country is divided in 4 zones, prices varying by zone; *p* Country is divided into 4 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A S. Phila., or N. Y.

	Current Market		1939		1938	
			Low	High	Low	High
Orange-Mineral, 1100 lb cks NY ....lb.	...	.10¼	...	.10¼	.09½	.10½
Orthoaminophenol, 50 lb kgs lb.	2.15	2.25	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs lb.	.70	.74	.70	.74	.70	.74
Orthochlorophenol, drs ...lb.	...	.32	...	.32	.32	.75
Orthocresol, 30.4°, drs, wks lb.	.14½	.15	.14½	.17½	.13½	.17½
Orthodichlorobenzene, 1000 lb drs ....lb.	.06	.07	.06	.07	.06	.07
Orthonitrochlorobenzene, 1200 lb drs, wks ....lb.	.15	.18	.15	.18	.15	.18
Orthonitroparachlorphenol, tins ....lb.	...	.75	...	.75	...	.75
Orthonitrophenol, 350 lb drs ....lb.	.85	.90	.85	.90	.85	.90
Orthonitrotoluene, 1000 lb drs. wks ....lb.	...	.09	.08	.10	.08	.10
Orthotoluidine, 350 lb bbls, l-c-l ....lb.	...	.19	.16	.19	16	.17
Osage Orange, cryst, bbls lb.	.19	.25	.17	.25	.17	.25
51° liquid ....lb.	...	.09	.07	.09	.07	.08
P						
Paraffin, rfd, 200 lb bgs						
122-127° M P ....lb.	.03¾	.039	.03¾	.039	.03¾	.04½
128-132° M P ....lb.	.04	.0435	.04	.0435	.04	.049
133-137° M P ....lb.	...	.0465	...	.0465	.0465	.05¾
Para aldehyde, 99%, tech, 110-55 gal drs, wks lb.	.10	.11¼	.10	.16*	.16*	.18*
Aminoacetanilid, 100 lb kgs ....lb.	...	.85	...	.85	...	.85
Aminohydrochloride, 100 lb kgs ....lb.	1.25	1.30	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.	...	1.05	...	1.05	...	1.05
Chlorophenol, drs ....lb.	.30	.45	.30	.45	.30	.45
Dichlorobenzene, 200 lb drs, wks ....lb.	.11	.12	.11	.12	.11	.12
Formaldehyde, drs, wks lb.	.34	.35	.34	.35	.34	.35
Nitroacetanilid, 300 lb bbls ....lb.	.45	.52	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wks ....lb.	.45	.47	.45	.47	.45	.47
Nitrochlorobenzene, 1200 lb drs, wks ....lb.	.15	.16	.15	.16	.15	.16
Nitro-orthotoluidine, 300 lb bbls ....lb.	2.75	2.85	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	.35	.37	.35	.37	.35	.37
Nitrosodimethylaniline, 120 lb bbls ....lb.	.92	.94	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	...	.30	.30	.35	...	.35
Phenylenediamine, 350 lb bbls ....lb.	1.25	1.30	1.25	1.30	1.25	1.30
Toluenesulfonamide, 175 lb bbls. ....lb.	.70	.75	.70	.75	.70	.75
tks, wks ....lb.	...	.31	...	.31	...	.31
Toluenesulfonchloride, 410 lb bbls, wks ....lb.	.20	.22	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks ....lb.	.48	.50	.48	.58	.56	.58
Paris Green, dealers, drs lb.	.23	.26	.23	.26	.23	.26½
Pentane, normal, 28-38° C, group 3, tks ....gal.	...	.08½	...	.08½	...	.08½
drs, group 3 ....gal.	.11½	.16	.11½	.16	.11½	.16
Perchlorethylene, 100 lb drs, frt all'd ....lb.	.08	.08¾	.08	.10½	...	.10½
Petrolatum, dark amber, bbls ....lb.	.02⅝	.02¾	.02⅝	.02¾	.02⅝	.03⅞
Light, bbls ....lb.	.03⅛	.03⅜	.03⅛	.03⅜	.03⅛	.03⅜
Medium, bbls ....lb.	.02⅞	.03⅛	.02⅞	.03⅛	.02⅞	.03⅛
Dark green, bbls ....lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
Red, bbls ....lb.	.02½	.03⅝	.02½	.03⅝	.02½	.03⅝
White, lily, bbls ....lb.	.05¼	.07⅛	.05¼	.07⅛	.05¼	.07⅛
White, snow, bbls ....lb.	.06¼	.08⅛	.06¼	.08⅛	.06¼	.08⅛
Petroleum Ether, 30-60°, group 3, tks ....gal.	...	.13	...	.13	...	.13
drs, group 3 ....gal.	.14	.17	.14	.17	.14	.17
PETROLEUM SOLVENTS AND DILUENTS						
Cleaners naphthas, group 3, tks, wks ....gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
East Coast, tks, wks gal.	...	.10	...	.10	...	.10
Hydrogenated, naphthas, frt all'd East, tks ....gal.	...	.16	...	.16	...	.16
No. 2, tks ....gal.	...	.18	...	.18	...	.18
No. 3, tks ....gal.	...	.16	...	.16	...	.16
No. 4, tks ....gal.	...	.18	...	.18	...	.18
Lacquer diluents, tks, East Coast ....gal.	...	.09	.09	.12½	.12	.12½
Group 3, tks ....gal.	.07⅜	.07⅝	.07⅜	.07⅝	.07⅜	.08⅜
Naphtha, V.M.P., East, tks wks ....gal.	...	.09	.09	.10	.09½	.10
Group 3, tks, wks ..gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
Petroleum thinner, 43-47, East, tks, wks ....gal.	...	.08½	.08½	.10	.08½	.10
Group 3, tks, wks ..gal.	.05⅜	.05⅝	.05⅜	.05⅝	.05⅜	.06⅜
Rubber Solvents, stand grd. East, tks, wks ....gal.	...	.09	.09	.10	.09½	.10
Group 3 tks, wks ...gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
Stoddard Solvent, East, tks, wks ....gal.	...	.08½	.08½	.10	.09½	.10
Group 3, tks, wks ..gal.	.05⅞	.06⅛	.05⅞	.06⅛	.05⅞	.06⅞
Phenol, 250-100 lb drs ...lb.	.13	.14¾	.13	.15½	.14½	.15½
tks, wks ....lb.	...	.12	.12	.13½	...	.13½
Phenyl-Alpha-Naphthylamine, 100 lb kgs ....lb.	...	1.35	...	1.35	...	1.35
Phenyl Chloride, drs ....lb.	...	.17	...	.17	...	.17
Phenylhydrazine Hydrochloride, com ....lb.	...	1.50	...	1.50	...	1.50

* These prices were on a delivered basis.

Current

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Phloroglucinol, tech, tins . . lb.	15.00	16.50	15.00	16.50	15.00	16.50
CP, tins . . . . lb.	20.00	22.00	20.00	22.00	20.00	22.00
Phosphate Rock, f.o.b. mines						
Florida Pebble, 68% basis ton	. . .	1.85	. . .	1.85	. . .	1.85
70% basis . . . . ton	. . .	2.35	. . .	2.35	. . .	2.35
72% basis . . . . ton	. . .	2.85	. . .	2.85	. . .	2.85
75-74% basis . . . . ton	. . .	3.85	. . .	3.85	. . .	3.85
75% basis . . . . ton	. . .	5.50	. . .	5.50	. . .	5.50
Tennessee, 72% basis . . ton	. . .	4.50	. . .	4.50	. . .	4.50
Phosphorus Oxychloride 175						
lb cyl . . . . lb.	.16	.20	.16	.20	.16	.20
Red, 110 lb cases . . . . . lb.	40	.44	.40	.44	.40	.44
Sesquisulfide, 100 lb cs . . lb.	.38	.44	.38	.44	.38	.44
Trichloride, cyl . . . . lb.	.15	.18	.15	.18	.15	.18
Yellow, 110 lb cs, wks . lb.	.24	.30	.24	.30	.24	.30
Phthalic Anhydride, 100 lb						
drs, wks . . . . lb.	. . .	.14½	. . .	.14½	. . .	.14½
Pine Oil, 55 gal drs or bbls						
Destructive dist . . . . lb.	46	.48	.46	.48	.46	.55
Steam dist wat wh bbls gal.	. . .	.59	. . .	.59	. . .	.59
tks . . . . gal.	. . .	.54	. . .	.54	. . .	.54
Pitch Hardwood, wks . . . ton	18.25	18.75	18.25	18.75	18.25	18.75
Coaltar, bbls, wks . . . . ton	. . .	19.00	. . .	19.00	. . .	19.00
Burgundy, dom, bbls, wks lb.	.05½	.06½	.05½	.06½	.05½	.06½
Imported . . . . lb.	.15	.16	.15	.16	.15	.16
Petroleum, see Asphaltum in Gums' Section.						
Pine, bbls . . . . bbl.	6.00	6.25	6.00	6.25	5.75	6.25
Stearin, drs . . . . lb.	.03	.04½	.03	.04½	.03	.04½
Platinum, ref'd . . . . oz.	32.00	35.00	32.00	35.00	30.00	39.00
POTASH						
Potash, Caustic, wks, sol . . lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
flake . . . . lb.	.07	.07⅜	.07	.07⅜	.07	.07⅜
Liquid, tks . . . . lb.	. . .	.02⅞	. . .	.02⅞	. . .	.02⅞
Manure Salts, imported						
30% basis, blk . . . . unit	. . .	.58½	. . .	.58½	. . .	.58½
Potassium Abietate, bbls . . lb.	. . .	.09	. . .	.09	.08	.13
Acetate, tech, bbls, delv lb.	. . .	.26	. . .	.26	.26	.28
Bicarbonate, USP, 320 lb						
bbls . . . . lb.	. . .	.18	. . .	.18	. . .	.18
Bichromate Crystals, 725						
lb cks* . . . . lb.	.08¾	.09¼	.08¾	.09¼	.08¾	.09¼
Binoxalate, 300 lb bbls . . lb.	. . .	.23	. . .	.23	. . .	.23
Bisulfate, 100 lb kgs . . . . lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800						
lb cks . . . . lb.	.06½	.07	.06½	.07	.06½	.07
liquid, tks . . . . lb.	. . .	.02⅞	. . .	.02⅞	. . .	.02⅞
drs, wks . . . . lb.	.03	.03½	.03	.03½	.03	.03½
Chlorate crys, 112 lb kgs,						
wks . . . . lb.	.09¼	.09½	.09¼	.09½	.09¼	.09½
gran, kgs . . . . lb.	.12	.13	.12	.13	.12	.13
powd, kgs . . . . lb.	.08½	.08¾	.08½	.08¾	.08½	.08¾
Chloride, crys, bbls . . . . lb.	.04	.04¾	.04	.04¾	.04	.04¾
Chromate, kgs . . . . lb.	.19	.28	.19	.28	.19	.28
Cyanide, 110 lb cases . . . lb.	.50	.55	.50	.55	.50	.57½
Iodide, 250 lb bbls . . . . lb.	. . .	1.13	. . .	1.13	.93	1.13
Metabisulfite, 300 lb bbls lb.	.11	.12½	.11	.13½	.12	.15
Muriate, bgs, dom, blk unit	. . .	.53½	. . .	.53½	. . .	.53½
Oxalate, bbls . . . . lb.	.25	.26	.25	.26	.25	.26
Perchlorate, kgs, wks . . . lb.	.09	.10½	.09	.10½	.09	.11½
Permanganate, USP, crys,						
500 & 1000 lb drs, wks lb.	.18½	.19½	.18½	.19½	.18½	.19½
Prussiate, red, bbls . . . . lb.	.30½	.34	.30½	.34	.30½	.37
Yellow, bbls . . . . lb.	.14	.15	.14	.16	.15	.16
Sulfate, 90% basis, bgs ton	. . .	36.25	36.25	38.00	. . .	38.00
Titanium Oxalate, 200 lb						
bbls . . . . lb.	.35	.40	.35	.40	.35	.40
Pot & Mag Sulfate, 48% basis						
bgs . . . . ton	. . .	24.75	24.75	25.75	. . .	25.75
Propane, group 3, tks . . . . lb.	.03	.04⅜	.03	.04⅜	.03	.04⅜
Putty, coml, tubs . . . 100 lb.	. . .	3.00	. . .	3.00	2.25	3.00
Linseed Oil, kgs . . . . 100 lb.	. . .	4.50	. . .	4.50	4.00	4.65
Pyrethrum, conc liq:						
2.4% pyrethrins, drs, frt						
all'd . . . . gal.	7.15	7.50	5.75	7.50	5.00	6.75
3.6% pyrethrins, drs, frt						
all'd . . . . gal.	10.65	11.00	8.45	11.00	7.65	9.95
Flowers, coarse, Japan,						
bgs . . . . lb.	.33	.36	.26	.36	.18	.28½
Fine powd, bbls . . . . . lb.	.35	.37	.27	.37	.19	.30
Pyridine, denat, 50 gal drs gal.	. . .	1.63	. . .	1.63	1.53	1.63
Refined, drs . . . . lb.	. . .	.50	. . .	.50	.45	.50
Pyrites, Spanish cif Atlantic						
ports, blk . . . . unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins lb.	2.15	2.75	2.15	2.75	2.15	2.75
Q						
Quebracho, 35% liq tks . . lb.	. . .	.02⅞	.02⅞	.03⅜	.03	.03⅜
450 lb bbls, c-l . . . . . . lb.	. . .	.04	.04	.04⅛	.03½	.04⅛
Solid, 63%, 100 lb bales						
cif . . . . lb.	. . .	.04	. . .	.04	. . .	.04
Clarified, 64%, bales . . lb.	. . .	.04¼	. . .	.04¼	. . .	.04¼
Quercitron, 51 deg liq, 450 lb						
bbls . . . . lb	.07½	.08½	.07½	.08½	.06	.08½
Solid, drs . . . . lb.	.10	.12	.10	.12	.10	.12
R						
R Salt, 250 lb bbls, wks . lb.	.52	.55	.52	.55	.52	.55
Resorcinol tech, cans . . . . . lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst . . . . . lb.	.18¾	.19¼	.17¾	.19¼	.15	.18¼
Powd, bbls . . . . lb.	.17¾	.18¼	.16¾	.18¼	.16	.18½
Rosin Oil, bbls, first run gal.	.45	.47	.45	.47	.45	.60
Second run . . . . gal.	.47	.49	.47	.49	.47	.62
Third run, drs . . . . gal.	.51	.53	.51	.53	.51	.66

* Spot price is ⅛c higher.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:***						
B	...	5.40	4.60	5.40	4.65	6.00
D	...	5.70	4.95	5.70	4.75	6.00
E	...	5.90	5.20	5.90	4.90	6.00
F	...	6.30	5.50	6.30	5.05	7.00
G	...	6.30	5.75	7.00	5.25	7.05
H	6.65	6.67½	5.75	7.10	5.25	7.15
I	6.65	6.70	5.77½	7.12½	5.25	7.15
K	6.65	6.70	5.80	7.15	5.25	7.25
M	6.65	6.70	5.90	7.25	5.25	7.40
N	6.80	6.85	6.75	7.40	6.20	7.50
WG	7.25	7.30	7.10	7.70	6.75	8.45
WW	...	7.60	7.50	8.50	7.55	9.15
Rosins, Gum, Savannah (280 lb unit):**						
B	...	4.00	3.25	4.00	3.25	4.60
D	...	4.30	3.55	4.30	3.50	4.60
E	...	4.50	3.80	4.50	3.55	4.60
F	...	4.90	4.10	4.90	3.90	5.60
G	...	4.90	4.40	5.60	4.10	5.65
H	5.25	5.27½	4.40	5.70	4.20	5.75
I	5.25	5.30	4.40	5.72½	4.20	5.85
K	5.25	5.30	4.40	5.75	4.20	6.00
M	5.25	5.30	4.40	5.85	4.20	6.15
N	5.40	5.45	5.20	6.00	4.80	6.20
WG	.	5.85	5.80	6.30	5.40	7.05
WW	...	6.20	6.20	7.10	6.10	7.75
X	.	6.20	6.20	7.10	6.10	7.75
Rosin, Wood, c-l, FF grade, NY	4.00	6.45	5.35	5.25	5.05	6.40
Rotten Stone, bgs mines . . ton	25.50	37.50	22.50	37.50	22.50	35.00
Imported, lump, bbls . . lb.		.14	...	.14	.12	.14
Powdered, bbls . . . . . . lb.	.08½	.10	.08½	.10	.08½	.10
S						
Sago Flour, 150 lb bgs . . . lb.	.02½	.03½	.02½	.03½	.02½	.03¾
Sal Soda, bbls, wks . . . 100 lb.	.	1.20	...	1.20	...	1.20
Salt Cake, 94-96%, c-l, wks ton	19.00	25.00	19.00	25.00	19.00	23.00
Chrome, c-l, wks . . . . . ton	11.00	12.00	11.00	12.00	11.00	12.00
Saltpetre, gran, 450-500 lb bbls . . . . . . lb.	.06½	.069	.06½	.069	.06½	.069
Cryst, bbls . . . . . . lb.	.07½	.0865	.07½	.0865	.07½	.0865
Powd, bbls . . . . . . lb.	.07½	.079	.07½	.079	.07½	.079
Satin, White, pulp, 550 lb bbls . . . . . . lb.	.01¼	.01½	.01¼	.01½	.01¼	.01½
Schaeffer's Salt, kgs . . . lb.	.46	.48	.46	.48	.46	.48
Shellac, Bone dry, bbls . . lb. r	.18	.19	.18	.20	.16½	.20
Garnet, bgs . . . . . . lb.	.12½	.13	.12½	.13	.12½	.15
Superfine, bgs . . . . . . lb. s	.10	.10½	.10	.11½	.11	.13½
T. N., bgs . . . . . . lb. s	.09½	.10	.09½	.11	.10½	.12½
Silver Nitrate, vials . . . . . oz.	.26⅞	.29⅛	.26⅞	.33½	.33½	.34⅞
Slate Flour, bgs, wks ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks . . . . . . 100 lb.	...	1.10	...	1.10	...	1.10
58% light, bgs . . . . . 100 lb.	...	1.08	...	1.08	...	1.08
blk . . . . . . 100 lb.	...	.90	...	.90	...	.90
paper bgs . . . . . . 100 lb.	...	1.05	...	1.05	...	1.05
bbls . . . . . . 100 lb.	...	1.35	...	1.35	...	1.35
Caustic, 76% grnd & flake, drs . . . . . . 100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drs . . . . 100 lb.	...	2.30	...	2.30	...	2.30
Liquid sellers, tks . . 100 lb.	...	1.97½	...	1.97½	...	1.97½
Sodium Abietate, drs . . lb.	...	.11	...	.11	.10	.13
Acetate, 60% tech, gran, powd, flake, 450 lb bbls wks . . . . . . lb.	.04	.05	.04	.05	.04	.05
anhyd, drs, delv . . . . . lb.	.	.08¼	. .	.08¼	...	.08¼
Alginate, drs . . . . . . lb.	.71	.95	.70	.95	.69	.70
Antimoniate, bbls . . . . . . lb.	.11½	.12	.11½	.12½	.12	.15¼
Arsenate, drs . . . . . . lb.	.08	.08½	.08	.08½	.08	.08½
Arsenite, liq, drs . . . . . gal.	...	.35	.30	.35	.30	.33
Dry, gray, drs, wks . . lb.	.07½	.09½	.07½	.09½	.07½	.09½
Benzoate, USP kgs . . . lb.	.46	.48	.46	.48	.46	.48
Bicarb, powd, 400 lb bbl, wks . . . . . . 100 lb.	...	1.85	...	1.85	...	1.85
Bichromate, 500 lb cks, wks*	.06¾	.07¼	.06¾	.07¼	.06¾	.07¼
Bisulfite, 500 lb bbls, wks lb.	.033	.036	.03¼	.036	.03	.036
35-40% sol bbls, wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
Chlorate, bgs, wks . . . . lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks . . . . lb.	.14	.15	.14	.15	.14	.17½
Diacetate, 33-35% acid, bbls, lcl, delv . . . . . lb.	...	.09	...	.09	...	.09
Fluoride, white 90%, 300 lb. bbls, wks . . . . . . lb.	.07¼	.08¾	.07¼	.08¾	.07½	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks . . . . . . lb.	.16	.17	.16	.17	.16	.17
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	...	2.80	...	2.80	2.50	2.80
Tech, reg cryst, 375 lb bbls, wks . . . . . . 100 lb.	2.45	2.80	2.45	2.80	2.40	2.80
Iodide, jars . . . . . . lb.	...	2.10	...	2.10	1.90	2.10
Metal, drs, 280 lbs . . . . lb.	...	.19	...	.19	...	.19
Metanilate, 150 lb bbls . . lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks . . . . . . 100 lb.	...	2.20	...	2.20	2.15	2.20
cryst, drs, c-l, wks 100 lb.	...	2.90	...	2.90	2.75	2.90
Monohydrated, bbls . . . . lb.	. .	.023	...	.023	...	.023
Naphthenate, drs . . . . . . lb.	.12	.19	.12	.19	.12	.19
Naphthionate, 300 lb bbl lb.	...	.50	.50	.54	.52	.54
Nitrate, 92%, crude, 200 lb bgs, c-l, NY . . . . . . ton	...	28.30	...	28.30	...	28.30
100 lb bgs . . . . . . ton	...	29.00	...	29.00	...	29.00
Bulk . . . . . . ton	...	27.00	...	27.00	...	27.00

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; s T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y. * Spot price is ⅛c higher. ** June 30. *** June 30.

Current

Sodium Nitrite
Tartar Emetic

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Sodium (continued):						
Nitrite, 500 lb bbls ...lb.	.06¾	.11½	.06¾	.11½	.06¾	.11½
Orthochlorotoluene, sulfonate, 175 lb bbls, wks..lb.	.25	.27	.25	.27	.25	.27
Orthosilicate, 300 lb drs, c.l. ....lb.	...	2.90	2.90	2.90	2.90	2.90
Perborate, drs, 400 lbs..lb.	.14¾	.15¼	.14¾	.15¼	.14¾	.15¼
Peroxide, bbls, 400 lb..lb.	...	.17	...	.17	...	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	...	2.05	...	2.05	...	2.05
bgs, wks ......100 lb.	...	1.85	...	1.85	...	1.85
Tri-sodium, tech, 325 lb bbls, wks ......100 lb.	...	2.20	...	2.20	...	2.20
bgs, wks ......100 lb.	...	2.00	...	2.00	...	2.00
Picramate, 160 lb kgs..lb.	.65	.67	.65	.67	.65	.67
Prussiate, Yellow, 350 lb bbl, wks ....lb.	.09½	.10	.09½	.10	.09	.11½
Pyrophosphate, anhyd, 100 lb bbls f.o.b. wks frt eq lb.	...	.0530	...	.0530	.0530	.10
Sesquisilicate, drs, c-l, wks ....100 lb.	...	2.80	...	2.80	2.80	3.00
Silicate, 60°, 55 gal drs, wks ....100 lb.	1.65	1.70	1.65	1.70	1.65	1.70
40°,55 gal drs, wks 100 lb.	...	.80	...	.80	...	.80
tks, wks ......100 lb.	...	.65	...	.65	...	.65
Silicofluoride, 450 lb bbls NY ....lb.	.04	.04¼	.04	.04¾	.04¾	.06½
Stannate, 100 lb drs ...lb.	.31½	.34½	.30	.35	.25½	.34
Stearate, bbls ....lb.	.19	.24	.19	.24	.19	.24
Sulfanilate, 400 lb bbls lb.	.16	.18	.16	.18	.16	.18
Sulfate Anhyd, 550 lb bgs* c-l, wks ....100 lb. †	1.45	1.90	1.45	1.90	1.45	1.90
Sulfide, 80% cryst, 440 lb bbls, wks ....lb.	...	.02¼	...	.02¼	...	.02¼
Solid, 650 lb drs, c-l, wks ....lb.	...	.03	...	.03	...	.03
Sulfite, cryst, 400 lb bbls, wks ....lb.	.023	.02½	.023	.02½	.023	.02½
Sulfocyanide, drs .....lb.	.28	.47	.28	.47	.28	.47
Sulforicinoleate, bbls...lb.	...	.12	...	.12	...	.12
Tungstate, tech, crys, kgs lb.	1.05	1.10	1.05	1.10	1.05	1.35
Sorbitol, com, solut, wks c-l, drs, wks ....lb.	...	.15½	...	.15½	.15½	.19
Spruce Extract, ord, tks..lb.	...	.01⅛	...	.01⅛	...	.01⅛
Ordinary, bbls ....lb.	...	.01⅝	...	.01⅝	...	.01⅝
Super spruce ext, tks ..lb.	...	.01⅜	...	.01⅜	...	.01⅜
Super spruce ext, bbls..lb.	...	.01⅞	...	.01⅞	...	.01⅞
Super spruce ext, powd, bgs ....lb.	...	.04	...	.04	...	.04
Starch, Pearl, 140 lb bgs 100 lb.	2.40	2.70	2.40	2.85	2.40	3.18
Powd, 140 lb bgs ..100 lb.	2.50	2.70	2.50	2.90	2.50	3.28
Potato, 200 lb bgs .....lb.	.04	.05	.04	.05	.03½	.05½
Imp, bgs ....lb.	.05	.06	.05	.06	.05	.06
Rice, 200 lb bbls ......lb.	.06¼	.07¼	.06¼	.07¼	.06¼	.07¼
Sweet Potato, 240 lb bbls, f.o.b. plant ......100 lb.	7.25	7.50	7.25	7.50	...	...
Wheat, thick, bgs .....lb.	.05	nom.	.05	.05½	.06¼	.07
Strontium carbonate, 600 lb bbls, wks ....lb.	.16½	.17½	.16½	.17½	.16½	.17
Nitrate, 600 lb bbls, NY lb.	.07¾	.08¼	.07¾	.08¼	.07¾	.09¼
Sucrose octa-acetate, den, grd, bbls, wks ....lb.	...	.45	...	.45	...	.45
tech, bbls, wks ....lb.	...	.40	...	.40	...	.40
Sulfur, crude, f.o.b. mines ton	...	16.00	...	16.00	16.00	19.00
Flour, coml, bgs ...100 lb.	1.65	2.35	1.65	2.35	1.65	2.35
bbls ....100 lb.	1.95	2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs..100 lb.	2.20	2.80	2.20	2.80	2.20	2.80
bbls ....100 lb.	2.55	3.15	2.55	3.15	2.55	3.15
Extra fine, bgs ....100 lb.	2.85	3.00	2.85	3.00	2.85	3.00
Superfine, bgs .....100 lb.	2.65	2.80	2.65	2.80	2.65	2.80
bbls ....100 lb.	2.25	3.10	2.25	3.10	2.25	3.10
Flowers, bgs ......100 lb.	3.00	3.75	3.00	3.75	3.00	3.75
bbls ....100 lb.	3.35	4.10	3.35	4.10	3.35	4.10
Roll, bgs ....100 lb.	2.35	3.10	2.35	3.10	2.35	3.10
bbls ....100 lb.	2.50	3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, 700 lb drs, wks ....lb.	.03	.04	.03	.04	.03	.04
Sulfur Dioxide, 150 lb cyl lb.	.07	.09	.07	.09	.07	.09
Multiple units, wks ...lb.	.04½	.07	.04½	.07	.04½	.07
tks, wks ....lb.	.04	.05	.04	.05	.04	.05
Refrigeration, cyl, wks lb.	.16	.17	.16	.17	.16	.17
Multiple units, wks ...lb.	.07½	.10	.07½	.10	.07½	.10
Sulfuryl Chloride ....lb.	.15	.40	.15	.40	.15	.40
Sumac, Italian, grd .....ton	...	65.50	65.50	67.00	62.00	68.00
Extract, 42°, bbls ....lb.	.05¼	.06¼	.05¼	.06¼	.05¼	.06¼
Superphosphate, 16% bulk, wks ....ton	...	8.00	...	8.00	8.00	9.00
Run of pile ....ton	...	7.50	...	7.50	7.50	8.50
Triple, 40-48%, a.p.a. bulk, wks, Balt. unit .....ton	...	.70	...	.70	.70	.85
Talc, Crude, 100 lb bgs, NY ton	13.00	15.00	13.00	15.00	13.00	15.00
Ref'd, 100 lb bgs, NY ton	14.00	16.00	14.00	16.00	14.00	16.00
French, 220 lb bgs, NY ton	23.00	30.00	23.00	30.00	23.00	30.00
Ref'd, white, bgs, NY ton	45.00	60.00	45.00	60.00	45.00	60.00
Italian, 220 lb bgs to arr ton	60.00	62.00	60.00	62.00	60.00	62.00
Ref'd, white, bgs, NY ton	65.00	70.00	65.00	70.00	65.00	70.00
Tankage Grd, NY ...unit u	...	2.75	2.75	3.25	2.50	3.15
Ungrd ....unit u	...	2.75	2.75	3.55	2.35	3.00
Fert grade, f.o.b. Chgo unit u	...	2.50	2.50	3.50	2.25	3.00
South American cif unit u	...	3.00	3.00	3.35	3.00	3.45
Tapioca Flour, high grade, bgs ....lb.	.02½	.04	.01¾	.05½	.02	.05½
Tar Acid Oil, 15%, drs..gal.	.21	.23	.21	.24	.21	.25½
25%, drs ....gal.	.25	.27	.25	.28	.25	.29½
Tar, pine, delv, drs .....gal.	.25	.26	.25	.26	...	.26
tks, delv, E. cities ....gal.	...	.20	...	.20	...	.20
Tartar Emetic, tech, bbls lb.	.27¾	.28	.27¾	.28	.26¾	.28
USP, bbls ....lb.	.33	.33½	.33	.33½	.32	.33½

† Bags 15c lower; u + 10; * Bbls. are 20c higher.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Terpineol, den grade, drs lb.	...	.17	...	.17	...	.17
Tetrachlorethane, 650 lb drs lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachloroethylene, drs, tech lb.	...	.09½	...	.09½	...	.09½
Tetralene, 50 gal drs, wks lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbls lb.	.20	.25	.20	.25	.20	.25
Tin, crystals, 500 lb bbls, wks lb.	.37½	.38	.35½	.38½	.31	.36½
Metal, NY ....lb.	...	.4845	.4520	.49	.3570	.4675
Oxide, 300 lb bbls, wks lb.	.52	.54	.50	.54	.44	.50
Tetrachloride, 100 lb drs, wks ....lb.	...	.24¼	.23	.24¾	.18½	.23½
Titanium Dioxide, 300 lb bbls lb.	.13¼	.16	.13¼	.16	.14½	.17
Barium Pigment, bbls..lb.	.05½	.06½	.05⅝	.06½	.05⅝	.06⅜
Calcium Pigment, bbls..lb.	.05½	.06½	.05⅝	.06½	.05⅝	.06⅜
Toluidine, mixed, 900 lb drs, wks ....lb.	.26	.27	.26	.27	.26	.27
Toluol, 110 gal drs, wks..gal.	...	.27	...	.27	.27	.35
8000 gal tks, frt all'd..gal.	...	.22	...	.22	.22	.30
Toner Lithol, red, bbls...lb.	.62	.67	.62	.80	.75	.80
Para, red, bbls ....lb.	.75	.80	.75	.80	.75	.80
Toluidine, bgs ....lb.	...	1.35	...	1.35	...	1.35
Triacetin, 50 gal drs, wks lb.	...	.36	...	.36	...	.36
Triamyl Borate, lcl, drs, wks lb.	...	.27	...	.27	...	.27
Triamylamine, c-l, drs, wks lb.	...	1.77	.77	1.25	.77	1.25
lcl, wks, drs, ...lb.	.78	.80	...	...	...	...
tks, wks, ...lb.	...	.75*	...	...	...	...
Tributylamine, lcl, drs, wks lb.	...	.70	...	.70	...	.70
cl, drs, wks ....lb.	...	.67	...	...	...	...
tks, wks ....lb.	...	.65	...	...	...	...
Tributyl citrate, drs, frt all'd lb.	...	.45	...	.45	...	.45
Tributyl Phosphate, frt all'd lb.	...	.42	...	.42	.42	.50
Trichlorethylene, 600 lb drs, frt all'd E. Rocky Mts..lb.	.08	.08¾	.08	.09½	.089	.09½
Tricresyl phosphate, tech, drs lb.	.23	.37½	.23	.37½	.23	.39
Triethanolamine, 50 gal drs wks ....lb.	.21	.22	.21	.22	.21	.22
tks, wks ....lb.	...	.20	...	.20	...	.20
Triethylene glycol, drs, wks lb.	...	.26	...	.26	...	.26
Trihydroxyethylamine Oleate, bbls ....lb.	...	.30	...	.30	...	.30
Stearate, bbls ....lb.	...	.30	...	.30	...	.30
Trimethyl Phosphate, drs, lcl f.o.b. dest ....lb.	...	.50	...	.50	...	.50
Trimethylamine, c-l, drs, frt all'd E. Mississippi ....lb.	...	1.00	...	1.00	...	1.00
Triphenylguanidine ......lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs..lb.	...	.38	...	.38	.34	.38
Tripoli, airfloated, bgs, wks ton	26.00	30.00	26.00	30.00	26.00	30.00
Turpentine (Spirits), c-l, NY dock, bbls ....gal.	...	.30**	.29	.35*	.26½	.31½
Savannah, bbls ....gal.	...	.24*	.23½	.29*	.20½	.30¾
Jacksonville, bbls .....gal.	...	.24*	.23½	.26¾	.20½	.30¾
Wood Steam dist, bbls, c-l, NY ....gal.	.27	.30	.242	.30	.242	.31
Wood, dest dist, c-l, drs, delv E. cities ......gal.	.23	.25	.22	.25	.22	.36
U						
Urea, pure, 112 lb cases..lb.	.14½	.15½	.14½	.15½	.14½	.15½
Fert grade, bgs, c.i.f...ton						
c.i.f. S.A. points ....ton	95.00	110.00	95.00	110.00	95.00	110.00
Dom. f.o.b., wks ......ton	95.00	101.00	95.00	101.00	95.00	101.00
Urea Ammonia, liq., nitrogen basis .... ton	...	121.58	...	...	...	...
V						
Valonia beard, 42%, tannin bgs ....ton	...	45.00	45.00	47.00	45.00	52.00
Cups, 32% tannin, bgs..ton	27.00	29.00	27.00	31.00	30.00	37.50
Extract, powd, 63% ...lb.	...	.06	...	.06	...	.06
Vanillin, ex eugenol, 25 lb tins, 2000 lb lots ... lb.	...	2.60	2.20	2.60	2.10	3.10
Ex-guaiacol ....lb.	...	2.50	2.10	2.50	2.00	3.00
Ex-lignin ....lb	...	2.50	2.10	2.50	2.00	2.25
Vermilion, English, kgs..lb.	1.59	1.66	1.50	1.70	1.45	1.69
W						
Wattle Bark, bgs ....ton	34.50	38.00	34.50	38.50	36.00	41.75
Extract, 60°, tks, bbls..lb.	...	.04	.04	.04⅜	.04⅜	.04⅝
WAXES						
Wax, Bayberry, bgs .... lb.	.25	.26	.16⅞	.26	.16⅞	.17
Bees, bleached, white 500 lb slabs, cases ......lb.	.33	.36	.33	.39	.35	.45
Yellow, African, bgs..lb	.19½	.20	.18½	.20	.19	.26
Brazilian, bgs .....lb.	.22½	.23½	.21	.23½	.22	.29
Chilean, bgs ......lb.	.22½	.23½	.21	.23½	.22	.29
Refined, 500 lb slabs, cases lb	.25½	.26	.25½	.33	.32	.39
Candelilla, bgs ....lb.	.15½	.16	.15¼	.16½	.13½	.16
Carnauba, No. 1, yellow, bgs ....lb	.41	.43	.36¾	.43	.38	.44
No. 2, yellow, bgs ...lb.	.40	.41	.35¾	.41½	.36	.42
No. 2, N. C., bgs ....lb.	.35	.35½	.34	.37	.34	.40
No. 3, Chalky, bgs...lb.	.29	.30½	.27½	.31½	.29	.35½
No. 3, N. C., bgs ...lb.	.30	.31	.28¾	.32½	.30	.35½
Ceresin, dom, bgs .....lb.	.08½	.11½	.08½	.11½	.08½	.11½
Japan, 224 lb cases ....lb	.12½	.13	.09¾	.13	.09¼	.11
Montan, crude, bgs ....lb.	.11	.11¾	.11	.11¾	.11	.12⅛
Paraffin, see Paraffin Wax.						
Spermaceti, blocks, cases lb.	.18	.21	.18	.21	.22	.24
Cakes, cases ....lb.	.19	.22	.19	.22	.23	.25
Whiting, chalk, com 200 lb bgs c-l, wks ....ton	12.00	14.00	12.00	14.00	12.00	14.00
Gilders, bgs, c-l, wks..ton	...	15.00	...	15.00	...	15.00
Wood Flour, c-l, bgs ...ton	20.00	30.00	20.00	30.00	20.00	33.00
Xylol, frt all'd, East 10° tks, wks ....gal.	...	.29	...	.29	.29	.33
Coml, tks, wks, frt all'd, gal.	...	.26	...	.26	.26	.30
Xylidine, mixed crude, drs lb.	.35	.36	.35	.36	.35	.36
Zinc Acetate, tech, bbls, lcl, delv ....lb.	.15	.16	.15	.21	...	.21
Arsenite, bgs, frt all'd..lb.	.12	.12½	.12	.13	.12½	.13
Carbonate tech, bbls, NY lb.	.14	.15	.14	.15	.14	.15

* July 31. ** July 31.

Current

Zinc Chloride
Oil, Whale

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Zinc (continued):						
Chloride fused, 600 lb drs, wks ... lb.	.04¼	.046	.04¼	.046	.04¼	.046
Gran, 500 lb drs, wks lb.	.05	.05¾	.05	.05¾	.05	.05¾
Soln 50%, tks, wks 100 lb.	...	2.25	...	2.25		2.25
Cyanide, 100 lb drs ... lb.	...	.33	...	.33	.33	.38
Dust, 500 lb bbls, c-l, delv lb.	...	.066	.06½	.06¾	.06	.0740
Metal, high grade slabs, c-l, NY ... 100 lb.	...	5.00	4.84	5.00	4.35	5.45
E. St. Louis ... 100 lb.	...	4.60	...	4.60	4.00	5.05
Oxide, Amer, bgs, wks .. lb.	.06¼	.07½	.06¼	.07½	.06	.07½
French 300 lb bbls, wks lb.	.06½	.07¾	.06½	.07¾	.06¼	.07¾
Palmitate, bbls ... lb.	.23	.25	.23	.25	.23	.25
Resinate, fused, pale bbls lb.	...	.10	...	.10	...	.10
Stearate, 50 lb bbls ... lb.	.20	.23	.20	.23	.20	.23
Zinc Sulfate, crys, 400 lb bbl, wks ... lb.	...	.029	...	.029	.029	.033
Flake, bbls ... lb.	..	.0325	..	.0325	.0325	.0375
Sulfide, 500 lb bbls, delv lb.	.07¾	.08	.07¾	.08⅞	.08⅝	.09¾
bgs, delv ... lb.	.07½	.07¾	.07½	.08⅝	.08⅜	[illegible]
Sulfocarbolate, 100 lb kgs lb.	.24	.26	.24	.26	.24	.26
Zirconium Oxide, crude, 73-75% grd, bbls, wks ... ton	75.00	100.00	75.00	100.00	75.00	100.00

Oils and Fats

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Babassu, tks, futures ... lb.	...	.06	.06	.06½	.06⅛	.06¾
Castor, No. 3, 400 lb drs lb.	.08¼	.09	.08¼	.10	.09¼	.10¾
Blown, 400 lb drs ... lb.	.10¼	.11	.10¼	.12	.11¼	.13
China Wood, drs, spot NY lb.	...	.22	.15	.22	.10¼	.15½
Tks, spot NY ... lb.	.21	nom.	.14½	.21	.095	.15¼
Coconut, edible, drs NY .. lb.	...	.08⅜	.08⅛	.08⅝	.08⅛	.09½
Manila, tks, NY ... lb.	...	.03	.03	.03⅛	.03⅛	.04¼
Tks, Pacific Coast .. lb.	.02⅝	.02¾	.02⅝	.03	.02⅝	.03¾
Cod, Newfoundland, 50 gal bbls ... gal.	.32	.33	.29	.35	.35	.52
Copra, bgs, NY ... lb.	...	.0165	.0165	.0180	.0170	.0235
Corn, crude, tks, mills .. lb.	.05¼	.05⅝	.05¼	.06⅝	.06⅜	.08¼
Refd, 375 lb bbls, NY .. lb.	.08⅜	.08½	.08⅜	.09¾	.09¼	.10½
Degras, American, 50 gal bbls NY ... lb.	.07	.08	.07	.08	.07½	.08¼
English, bbls, NY ... lb.	.07	.08	.07	.08	.07½	.08¼
Greases, Yellow ... lb.	.04⅛	.04⅜	.04⅜	.05⅛	.03½	.05½
White, choice, bbls, NY lb.	.04⅞	.05	.04⅞	.06	.05	.07
Lard, Oil, edible, prime .. lb.	...	.09¾	.09¾	.10¼	.10¼	.12¾
Extra, bbls ... lb.	...	.08¾	.09	.09⅜	.08¾	.10¾
Extra, No. 1, bbls ... lb.	...	.08½	.08½	.09¼	.08⅝	.09¾
Linseed, Raw less than 5 bbl lots ... lb.	.097	.099	.093	.10	.089	.115
bbls, c-l, spot ... lb.	.089	.091	.085	.093	.081	.102
Tks ... lb.	.083	.085	.079	.087	.07½	.096
Menhaden, tks, Baltimore gal.	.26	nom.	.26	.32	.34½	.37½
Refined, alkali, drs ... lb.	...	.064	.064	.077	.067	.095
Tks ... lb.	...	.058	.058	.071	.061	.087
Kettle bodied, drs ... lb.	...	.076	.076	.088	.076	.105
Light pressed, drs ... lb.	...	.058	.058	.071	.061	.091
Tks ... lb.	...	.052	.052	.065	.05½	.08
Neatsfoot, CT, 20°, bbls, NY lb.	...	.14¾	.14¾	.15¼	.15¼	.17¼
Extra, bbls, NY ... lb.	...	.08½	.08½	.09¼	.08⅝	.10
Pure, bbls, NY ... lb.	...	.11¾	.10¾	.12¼	.10¾	.12¼
Oiticica, bbls ... lb.	.16	.17	.09¼	.17	.09¼	.12¾
Oleo, No. 1, bbls, NY ... lb.	...	.08	.07¾	.08¾	.08½	.10½
No. 2, bbls, NY ... lb.	...	.07½	.07	.08	.08	.10
Olive, denat, bbls, NY .. gal.	.82	.83	.82	.93	.86	1.20
Edible, bbls, NY ... gal.	1.75	2.00	1.75	2.00	1.75	2.35
Foots, bbls, NY ... lb.	.06¾	.06⅞	.06¾	.07¼	.07	.09⅞
Palm, Kernel, bulk ... lb.	...	.035	.0340	.036	.0325	.04½
Niger, cks ... lb.	.03⅝	.03¾	.03⅝	.03⅞	...	..
Sumatra, tks ... lb.	...	.0265	.0265	.02¾	.02⅝	.0375
Peanut, crude, bbls, NY lb.	...	.06	.06	.07	.07	.08¼
Tks, f.o.b. mill ... lb.	...	.05¼	.05¼	.06⅝	.06⅝	.08
Refined, bbls, NY lb.	.08¾	.09	.08¾	.10	.09¾	.10¾
Perilla, drs, NY ... lb.	.11½	.11¾	.09½	.11¾	.09¾	.11¾
Tks, Coast ... lb	.11	.112	.089	.112	.09	.11
Pine, see Pine Oil, Chemical Section.						
Rapeseed, blown, bbls, NY lb.	.14	.14½	.14	.14½	.14	.14¾
Denatured, drs, NY .. gal	.80	.82	.80	.82	.75	.91
Red, Distilled, bbls ... lb.	.07¾	.08¾	.07⅜	.08¾	.07⅜	.10⅝
Tks ... lb.	.06½	.07½	.06½	.07½	.06½	.09¾
Sardine, Pac Coast, tks .. gal.	...	.24	.24	.34	.28	.46½
Refined alkali, drs ... lb.	...	.064	.064	.077	.067	.095
Tks ... lb	...	.058	.058	.071	.061	.087
Light pressed, drs ... lb.	...	.058	.058	.071	.061	.089
Tks ... lb.	...	.052	.052	.065	.05½	.08
Sesame, yellow, dom ... lb.	.09⅛	.09¼	.09	.10½	.10¼	.10½
White, dom ... lb.	.09⅛	.09¼	.09	.10½	.10¼	.10½
Soy Bean, crude						
Dom, tks, f.o.b. mills .. lb	.05	.05⅛	.05	.05¾	.05⅞	.07
Crude, drs, NY ... lb	.05¾	.06	.05¾	.065	.06½	.08
Ref'd, drs, NY ... lb.	.07	.07½	.07	.077	.07⅝	.097
Tks ... lb.	...	.06¼	.06¼	.0675	.0685	.082
Sperm, 38° CT, bleached bbls NY ... lb.	.09	.092	.09	.10	.10	.102
45° CT, bleached, bbls, NY ... lb.	.083	.085	.083	.093	.093	.095
Stearic Acid, double pressed dist bgs ... lb.	.10½	.11½	.10½	.11½	.10	.12
Double pressed saponified bgs ... lb.	.10¾	.11¾	.10¼	.11¾	.10¼	.12¼
Triple pressed dist bgs . lb.	.13½	.14½	.13	.14½	.13	.15
Stearine, Oleo, bbls ... lb.	.05½	.05¾	.05½	.06¾	.05½	.08½
Tallow City, extra loose .. lb.	...	.04¾	.04¾	.05⅜	.04¾	.06⅜
Edible, tierces ... lb.	.05	nom.	.05	.06	.06	.07⅝
Acidless, tks, NY ... lb.	...	.08	.08	.08¼	.07¾	.09¼
Turkey Red, single, drs .. lb.	.06	.07	.06	.08⅝	.06¼	.08½
Double, bbls ... lb.	.08¾	.09¾	.08¾	.10⅞	.09½	.13
Whale:						
Winter bleach, bbls, NY lb.	.081	.083	.081	.083	.081	.10
Refined, nat, bbls, NY .. lb	.077	.079	.077	.079	.077	.096

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Index to Advertisers

Abernethy Co., John F. 215
American-British Chemical Supplies, Inc. 205
American Cyanamid & Chemical Corp. .....Pages 126 and 127
American Flange & Manufacturing Co., Inc. 162
American Potash & Chemical Corp. 212

Bagpak Inc. 153
Baker Chemical Co., J. T. 219
Barrett Co. 209
Beacon Co. 219
Bemis Bro. Bag Co. 207
Bower Chemical Mfg. Co., Henry 215

Calco Chemical Co. .... Cover 1
Church & Dwight Co., Inc. 218
Claflin, Alan A. 220
Columbia Alkali Corp. 183

Diamond Alkali Co. 160
Doe & Ingalls, Inc. 220
Dow Chemical Co. 194
Dunkel & Co., Inc., Paul A. 216
Du Pont de Nemours & Co., Inc., E. I., Grasselli Chemicals Department 128

Eastman Kodak Company 205
Eastern Steel Barrel Corp. 215
Electro Bleaching Gas Co. 129

Fergusson Co., Alex C. 220
First Machinery Co. 221
Foote Mineral Co. 212
Fulton Bag & Cotton Mills 214

General Chemical Co. ....Cover 3
General Dyestuff Corp. 223
Grasselli Chemicals Dept., E. I. du Pont de Nemours & Co., Inc. 128
Gray & Co., William S. 219
Greeff & Co., R. W. 213

Harshaw Chemical Co. 203
Heyden Chemical Corp. 208
Hooker Electrochemical Co. 211
Howe & French, Inc. 220

Industrial Chemical Sales Division, West Virginia Pulp & Paper Co. 154

Jefferson Lake Oil Co., Inc. 210
Jungmann & Co. 210

King & Co., Inc., E. & F. 220

Index to Advertisers

La Pine 220
Lavanburg Co., Inc., Fred L., Division of Reichhold Chemicals Inc. 201

Mallinckrodt Chemical Works 184
Mann & Co., Inc., Geo. 220
Mathieson Alkali Works, Inc. 123
Mathieu & Co., A. H. 213
Merck & Co., Inc. 186
Monsanto Chemical Co. 177
Morgan, Inc., Clarence 220
Mutual Chemical Co. of America, Inc. 125

Natural Products Refining Co. 130
Neuberg, Inc., William 210
Niacet Chemicals Corp. 203

Oldbury Electro-Chemical Co. 218

Pacific Coast Borax Co. 218
Patterson Foundry & Machine Co., The 206
Pennsylvania Coal Products Co. 217
Petrometer Corp. 217
Pfizer & Co., Inc., Chas. 190
Phelps Dodge Refining Corp. 211
Philadelphia Quartz Co. 198
Polachek, Z. H. 221
Prior Chemical Corp. 178

Reichhold Chemicals, Inc. 201
Reilly Tar & Chemical Corp. 206
Reinhold Publishing Corp. 222

Schuylkill Chemical Co. 220
Sharples Solvents Corp. 181
Slomon, Ira I. 221
Sobin Co., Inc., Irving M. 220
Solvay Sales Corporation ....Cover 2
Starkweather Co., J. U. 220
Stauffer Chemical Co. 188

Tennessee Corp. 206
Texas Gulf Sulphur Co. 196
Textile Products Co. 220
Turner & Co., Joseph 219

U. S. Industrial Chemicals, Inc.
Insert facing pages 192 and 193
U. S. Potash Co. 216

Victor Chemical Works 159

Warner Chemical Co., Division Westvaco Chlorine Products Corp. 121
Wishnick-Tumpeer, Inc. ....Cover 4

"We"—Editorially Speaking

Cornell proudly claims as one of its illustrious sons Dr. Frank J. Tone (author of "Abrasives, 1918-1938," page 133). After receiving his M.E. "high above Cayuga's waters" in 1891 Dr. Tone became associated with the Thomson-Houston Electric Co. as an engineer, soon joined the Pittsburgh Traction Co., and in 1895 became works engineer of the Carborundum Co. He originated the first commercial procedure for the production of silicon. His subsequent contributions to the advancement of the abrasives industry have been widely recognized. As early as 1900 Dr. Tone received a medal at the Paris Exposition, and a year later he was further honored by the Pan American Exposition held in Buffalo. In 1935 the University of Pittsburgh conferred the honorary degree of Doctor of Science on him. In the same year Dr. Tone received the Edward Goodrich Acheson Medal, highest honor given by the Electrochemical Society. Dr. Tone is twice famous—first, for his outstanding developments in the abrasive field and, secondly, as the father of Franchot Tone.

The lounge at the Chemists' Club (N. Y.) seems strangely deserted these days. H. O. Chute, dendro-chemist, and author of "Wealth from Waste," page 150, has deserted his usual haunts for the lure of Hollywood. Our repeated entreaties that he leave the spot before he became too enamored were unavailing, so "We" issued peremptory orders that he proceed to San Francisco by August 8 to "look in" on the Western Chemical Conference. He promises a complete "low-down."

You'd be agreeably surprised to learn who some of the outstanding authors are in the "Wealth from Waste" series which starts in this issue with H. O. Chute's reminiscences. It is all a dark secret, however, until next month.

Did You Know That:—

During the last five years U. S. patents on chemical subjects have increased fifteen per cent. in number over the preceding five years, whereas there has been a decrease of twelve per cent. for the same periods in British patents of chemical interest, a decrease of twenty-three per cent. for similar French patents and a decrease of thirty per cent. in German chemical patents! As an A. C. S. publicity release aptly states it—"World leadership in chemistry has shifted from Germany to the U. S."

As short a period as three years ago the digest of U. S. patents in CHEMICAL INDUSTRIES took but five pages a month—now they take eight pages regularly.

Imagine our surprise to find our esteemed contemporary, *I. & E. C.*, going "sexey"—with a bathing beauty on page 967 of the August issue. "We" don't think she quite compares, however, with our July entry on page 25 nor with the young ladies on pages 142 and 143 of this issue, but, of course, "We" may be prejudiced.

The visit of Colonial Sugar's Harry Bass to these shores on his way back to Australia revived many an old story. The prize went to that one about the couple visiting the London Zoo and seeing a strange creature under a sign reading: The Platypus, a native of Australia; whereupon said she to him: "Blimey, my brother-in-law! My sister married one of them."

The son-in-law of H. Gardiner McKerrow (who was the real daddy of the Synthetic Organic Chemical Manufacturers Association) is one of the leading lights in the 40 Plus Club which has of late been getting favorable publicity. He's Shephard M. Crain and himself started business life with the war-famous Marden, Orth & Hastings, and of recent years has been New England Sales Manager for a pharmaceutical house.

Fifteen Years Ago

(From our files of August, 1924)

Spencer Kellogg & Sons, Buffalo, observes its hundredth anniversary in the crushing of linseed.

Pacific Coast Borax establishes a two-million-dollar refinery at Wilmington, Calif.

Synthetic methanol is produced in Germany, from carbon monoxide and hydrogen, at Badische Anilin's Leunawerke.

Gen. Amos A. Fries, head of the Chemical Warfare Service, selects a chief chemist for the Service, with the co-operation of a special committee of the American Chemical Society.

Owing to the death of William Gelshenen, the partnership existing between Frank Morse Smith and William Gelshenen is dissolved, and a new firm of H. J. Baker & Bro. is formed, whose partners are Frank Morse Smith, Edward A. Buck, James K. Welsh, Charles D. Rafferty and Henry V. B. Smith.

A neat example of chemicals replacing machines is cement in place of sewing to attach shoe soles. It is guessed in trade circles that 120 million pairs with cemented soles will be produced this year—that's better than one pair in four: chiefly ladies' slippers. Nitro-cellulose adhesives get the first call with rubber, neoprene and latex cements following as named.

Casein cement is the newest comer in this new field. Not much beyond the experimental stage, but promising much. The biggest casein use (about 85% of 67,000,000 lbs. annually) is in paper coating. But watch out for casein paints. In thirteen years they have come from zero to 5,000,000 gallons!

Congratulations to vulcanized rubber on its one hundredth birthday!

And read the three barrelled author's article in this issue if you think this centenarian is falling into senile decay.

The memory of the late Dr. John E. Teeple was honored last month, when a new sodium borate-chloride mineral, found in Borax Lake, Calif., was named for him. Discoverers of "Teepleite" are Dr. William F. Foshag, U. S. National Museum, and W. A. Gale, American Potash & Chemical Corp., who wished to recognize Dr. Teeple's services in the field of analytical chemistry.

That banker chap in Buffalo who has some real chemical sense, Bert H. White, had an article in the *Saturday Evening Post* for June 10 that, if you missed, you ought to go right now and hunt up and read. He asked 2,000 top-flight research men the most promising future development in applied science, and though neither he nor they so intended, there are plenty of bright sales ideas as well as research limits that every chemical executive will relish.

Billy Hale—speaking of chemical authors—has exchanged autographed copies of "Farmward March" and "Chemical Pioneers" with Billie Haynes—both new books having come from the presses (as the saying is) a few weeks ago.

After reading *Time's* recent market report on the potash situation, "We" still recommend that our readers get their market information from the news pages of CHEMICAL INDUSTRIES.

State of Chemical Trade

Current Statistics (July 31, 1939)—p. 39

WEEKLY STATISTICS OF BUSINESS

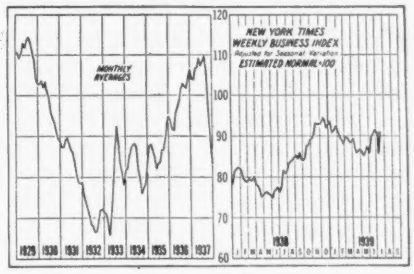
Week Ending	Carloadings 1939	Carloadings 1938	Carloadings % of Change	Electrical Output* 1939	Electrical Output* 1938	Electrical Output* % of Change	Jour. of Com. Price Index	Nat'l Chem. & Drugs	Fertilizer Fats & Oils	Ass'n Fert. Mat.	Price Indices Mixed Fert.	Price Indices All Groups	†Labor Dept. Chem. & Drug Price Index	% Steel Activity	N. Y. Times Index Bus. Act.	Fisher Commodity Index
July 1	665,528	588,880	+13.0	2,300,268	2,014,702	+14.2	75.1	91.9	47.1	68.3	77.3	71.9	74.9	54.5	90.8	126.8
July 8	559,109	500,981	+11.6	2,077,956	1,881,298	+10.5	75.6	91.9	47.1	67.5	77.3	72.0	74.7	39.5	85.8	126.3
July 15	673,812	602,445	+11.8	2,324,181	2,084,457	+11.5	75.0	91.9	45.2	67.5	77.2	71.6	74.7	50.5	91.0	127.0
July 22	656,341	580,818	+13.0	2,294,588	2,084,763	+10.1	74.1	91.9	44.4	67.5	77.2	71.2	74.6	58.5	90.3	127.4
July 29	659,764	588,697	+12.1	....	....	....	...	91.9	45.7	68.4	77.2	71.2	...	...	...	127.2

*K.W.H., 000 omitted †1926-1928 = 100.0.

MONTHLY STATISTICS

CHEMICAL:	June 1939	June 1938	May 1939	May 1938	April 1939	April 1938
Acid, sulfuric (expressed as 50° Baumé, short tons, Bureau of the Census)						
Total prod. by fert. mfrs.	140,580	114,199	155,902	137,764	145,689	143,469
Consumpt. in mfr. fert.	106,137	102,228	108,889	119,218	112,593	110,496
Stocks end of month	80,394	83,289	90,137	87,120	90,458	93,494
Alcohol, Industrial (Bureau Internal Revenue)						
Ethyl alcohol prod., proof gal.	16,827,178	16,395,185	18,655,264	14,252,840	17,858,504	12,816,786
Comp. denat. prod., wine gal.	861,138	2,492,965	695,326	903,603	240,918	297,743
Removed, wine gal.	813,449	2,437,779	597,648	803,863	184,319	300,348
Stocks end of mo., wine gal.	655,994	699,772	608,807	645,192	518,723	546,055
Spec. denat. prod., wine gal.	7,304,529	5,376,531	7,795,113	5,188,803	7,477,590	5,988,829
Removed, wine gal.	7,130,302	5,374,308	7,605,163	5,268,570	7,338,848	6,063,358
Stocks end of mo., wine gal.	1,325,563	491,852	1,157,127	495,937	973,027	581,247
Ammonia sulfate prod., tons *a*	42,253	27,967	33,064.5	32,002	39,634.5	34,342
Benzol prod., gal. *b*	7,292,000	4,413,000	5,546,000	4,905,000	6,813,000	5,385,000
Byproduct coke, prod., tons *a*	3,089,721	2,066,530	2,396,435	2,282,621	2,914,660	2,436,264
Cellulose Plastic Products (Bureau of the Census)						
Nitrocellulose sheets, prod., lbs.	704,235	429,439	755,527	415,981	802,067	453,596
Sheets, ship., lbs.	703,764	542,265	626,647	503,539	663,460	525,132
Rods, prod., lbs.	188,714	145,197	221,139	212,167	255,918	199,119
Rods, ship., lbs.	240,930	130,974	259,152	192,875	238,098	201,392
Tubes, prod., lbs.	63,772	37,011	59,539	40,096	58,420	37,989
Tubes, ship., lbs.	55,159	48,814	54,017	58,610	48,521	51,179
Cellulose acetate, sheets, rod, tubes						
Production, lbs.	446,093	288,385	490,684	257,722	508,264	249,185
Shipments, lbs.	378,046	323,356	508,786	253,491	522,346	259,209
Molding comp., ship.; lbs.	702,854	414,692	704,085	434,598	599,609	433,487
Methanol (Bureau of the Census)						
Production, crude, gals.	343,992	293,091	354,413	330,875	389,423	314,664
Production, synthetic, gals.	1,295,288	1,629,570	1,778,581	1,860,000	2,276,385	1,975,999
Pyroxylin-Coated Textiles (Bureau of the Census)						
Light goods, ship., linear yds.	2,361,536	2,145,433	2,652,199	2,559,071	2,642,840	2,598,653
Heavy goods, ship., linear yds.	2,025,048	1,318,114	2,106,754	1,527,494	1,933,597	1,657,602
Pyroxylin spreads, lbs. *c*	4,710,415	3,341,135	4,726,511	4,128,819	4,642,742	4,318,463
Exports (Bureau of Foreign & Dom. Commerce)						
Chemicals and related prod. *d*	$12,800,000	......	$15,000	$13,204	$14,600	$11,459
Crude sulfur *d*	$941	$1,048	$600	$956	$933	$1,130
Coal-tar chemicals *d*	$1,388	$821	$1,068	$980	$990	$1,025
Industrial chemicals *d*	$2,401	$1,992	$2,467	$2,088	$2,355	$2,269
Imports						
Chemicals and related prod. *d*	$5,300,000	......	$15,000	$11,400	$19,000	$6,728
Coal-tar chemicals *d*	$819	$887	$1,062	$1,579	$4,129	$1,256
Industrial chemicals *d*	$1,449	$1,434	$2,524	$1,188	$2,202	$1,159
Payrolls (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	......	......	120.7	115.7	120.5	114.3
Other than petroleum	......	......	117.1	108.3	118.0	108.0
Chemicals	129.2	118.1	128.9	116.8	127.9	117.4
Explosives	96.8	80.2	91.8	83.2	89.5	83.8
Employment (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	......	......	111.6	108.8	114.9	112.4
Other than petroleum	......	......	110.2	105.9	114.6	110.2
Chemicals	114.8	109.7	114.5	109.6	114.9	111.4
Explosives	86.4	80.2	82.0	80.3	80.8	81.4
Price index chemicals	79.2	80.6	79.4	81.2	79.3	81.9
Chem. and drugs	75.7	76.3	75.9	76.8	76.0	77.5
Fert. mat.	69.5	69.5	69.7	69.6	69.6	70.1
FERTILIZER:						
Exports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials	......	......	148,095	127,496	136,328	158,717
Ammonium sulfate	......	......	5,156	146	208	118
Total phosphate rock	......	......	99,844	97,038	111,181	132,573
Total potash fertilizers	......	......	22,166	4,437	5,710	11,073
Imports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials	......	......	147,175	126,150	189,213	159,614
Ammonium sulfate	......	......	11,388	7,393	10,685	10,493
Sodium nitrate	......	......	62,010	73,025	115,188	96,688
Total potash fertilizer	......	......	10,415	1,669	16,580	6,561

INDUSTRIAL TRENDS



Business: Midsummer finds business with distinct signs of improvement in industrial fields. Post-holiday recovery in rail traffic, and in the steel, textile, and automotive trades proved more than satisfactory. N. Y. *Times* Index of Activity held up well, the July average (about 89.5) being 10% higher than for July of '38, when the Index stood at 81.1.

Steel: Operations in mid-July set a new high for the year; in the week of July 14-19, per cent. capacity stood at 56.4—in the corresponding week of '38, the rate was between 32 and 33%. Automotive requirements were undoubtedly responsible for this boom in production. At the month-end, it is expected that mills will probably set a new 1939 high for production in the last week of July.

Automotive: Car and truck output rallied immediately after the July Fourth week-end. In the week of July 7-12, it was estimated that 61,610 units were turned out, in contrast to the comparatively low figure of 44,510 units for the like week a year ago. In the next few weeks, some easing-off in schedules is to be expected, with most plants engaged in change-overs.

Retail Trade: Moderate increases in sales, as compared with last July, were recorded for nearly all cities during the greater part of the month just ended. For the week ending July 22, department store sales showed an 8% gain, as compared with the corresponding week of a year ago. For the 4 weeks ending on that date, a 4% gain over the like '38 period was reported. Probably, retail activity in the coming month will average about 3-4% better than in last August.

State of Chemical Trade
Current Statistics (July 31, 1939)—p. 39

State of Chemical Trade

Current Statistics (July 31, 1939)—p. 40

Wholesale Trade: Activity in wholesale circles was more than usually brisk. Confidence in the outlook for Fall and Winter has spurred buying in cottons, rayon, leather and wool. The post-seasonal heavy demand for summer fabrics has crowded mill operators' schedules; in many cases, manufacturers of loom products have had to postpone their plans for supplying the winter markets with heavier goods.

Textiles: Knit and print goods, and other light apparel moved in heavy volume during the last 3 weeks of July; orders are now beginning to pile up for heavy Fall and Winter weaves. The wool market, out of the doldrums, has been very active and its prospects for the next 6 months are very bright. June rayon shipments were 27% better than in May, and midsummer deliveries should do even better.

Rubber: Tire replacements continued in heavy demand in early July, but the peak in replacements sales is now considered to have been passed. Crude rubber consumption in the third quarter is expected to match, if not better, the 135,802 tons taken in the Spring quarter.

Commodity Prices: During the month of July, the Dow-Jones Index fell off somewhat during the first 3 weeks, the month's low (47.03) on the 24th being 2.61 units below the Index on June 31 (49.64). Unsettled crop conditions are responsible, in the main, for the irregular fluctuations.

Carloadings: Rail tonnages continued to soar, 673,812 cars setting another high for the year in the week of the 15th.

Construction: Building contracts totaled $288,316,000 in June, nearly 14% more than in June of '38. A good volume of business is to be looked for in the remaining 6-month period, according to the F. W. Dodge Corporation.

Electric Energy: 2,341,822,000 Kwh. were consumed in the week ending July 29, highest output recorded since Christmas week of last year.

Outlook: The next month or two should prove to be among the most active of the year. Earnings statements for the first 6 months reflect the confident attitude that may be expected to prevail for the balance of this year. Contributing to the easier feeling have been the relaxation of tension in Europe and the streak of economy demonstrated by Congress in its reluctance to grant further large-scale appropriations.

MONTHLY STATISTICS (cont'd)

FERTILIZER: (Cont'd)	June 1939	June 1938	May 1939	May 1938	April 1939	April 1938
Superphosphate e (Nat. Fert. Association)						
Production, bulk	......	......	223,439	227,223	220,690	220,166
Shipments, total	......	......	532,795	410,067	807,405	756,121
Northern area	......	......	372,593	262,122	344,146	350,467
Southern area	......	......	160,202	147,945	463,259	405,654
Stocks, end of month, total	......	......	825,238	1,034,204	1,079,891	1,179,223
Tag Sales (short tons, Nat. Fert. Association)						
Total, 17 states	93,825	117,073	390,982	331,568	1,315,134	1,107,985
Total, 12 southern	86,192	116,361	312,313	275,761	1,271,077	1,039,745
Total, 5 midwest	7,633	712	78,669	55,807	44,057	68,240
Fertilizer payrolls	66.5	65.0	108.2	93.9	137.3	118.8
Fertilizer employment	71.6	69.0	113.2	100.1	160.2	136.3
Value imports, fert. and mat. *d*	......	......	......	$2,880	$4,370	$1,520
GENERAL:						
Acceptances outst'd'g *f*	$245	$264	$246	$268	$237	$278
Coal prod., anthracite, tons	3,183,000	3,868,567	4,455,000	3,821,416	5,227,000	3,138,000
Coal prod., bituminous, tons	26,101,000	22,850,000	15,100,000	21,266,000	10,747,000	21,671,000
Com. paper outst'd'g *f*	$248	$253	$188	$251	$191	$271
Failures, Dun & Bradstreet	952	1,073	1,122	1,123	1,140	1,172
Factory payrolls *i*	86.2	70.8	84.4	72.9	84.9	74.6
Factory employment *i*	90.7	81.6	90.1	83.4	91.2	85.7
Merchandise imports *i*	$178,953	$145,869	$202,502	$148,248	$186,195	$159,827
Merchandise exports *i*	$236,058	$232,726	$249,259	$257,276	$230,947	$274,472
GENERAL MANUFACTURING:						
Automotive production	309,720	174,670	297,508	192,059	337,372	219,310
Boot and shoe prod., pairs	31,639,808	26,897,189	32,222,072	30,472,552	32,577,945	33,467,918
Bldg. contracts, Dodge *j*	$288,316	$251,006	$308,487	$223,156	$330,030	$222,016
Newsprint prod., U. S. tons	80,562	65,382	85,872	68,001	77,393	58,836
Newsprint prod., Canada, tons.	240,545	201,546	250,015	207,678	220,843	200,794
Glass Containers, gross‡	4,662	3,583	4,516	3,837	4,071	3,647
Plate glass prod., sq. ft.	9,288,788	5,956,386	8,035,832	3,866,052	7,268,068	3,819,735
Window glass prod., boxes	720,227	344,456	728,653	360,256	738,951	341,014
Steel ingot prod., tons	3,130,381	1,632,843	2,917,876	1,800,000	2,986,985	1,919,042
% steel capacity	53.44	28.36	48.24	29.75	51.25	33.44
Pig iron prod., tons	2,118,451	1,062,021	1,717,516	1,255,024	2,033,259	1,376,141
U.S. cons'pt. crude rub., lg. tons	47,259	30,629	44,337	30,753	44,166	27,984
Tire shipments	5,733,216	3,928,590	4,753,403	3,273,000	4,356,000	3,143,000
Tire production	4,837,290	3,036,012	4,418,072	2,987,000	4,211,000	2,660,000
Tire inventories	8,803,924	8,470,304	9,918,759	11,597,000	9,998,000	10,141,000
Cotton consumpt., bales	......	......	605,363	426,149	546,702	414,392
Cotton spindles oper.	21,788,286	21,142,408	21,975,222	21,341,846	22,109,394	21,786,054
Silk deliveries, bales	26,256	31,492	26,150	28,687	21,802	33,381
Wool Consumption *z*	......	......	29.8	16.6	27.7	15.9
Rayon deliv., lbs.	32,900,00	18,100,000	25,900,000	16,200,000	23,100,000	16,300,000
Hosiery (all kinds) *t*	......	......	9,090,063	7,065,107	10,577,136	10,593,254
Rayon employment *i*	304.0	265.4	308.1	283.8	315.4	283.0
Rayon payrolls *i*	303.4	242.1	298.3	257.9	304.4	244.2
Soap employment *i*	89.8	85.0	87.7	85.0	88.4	86.9
Soap payrolls *i*	93.7	85.9	90.3	86.0	91.2	87.0
Paper and pulp employment *i*	......	......	106.7	102.9	106.3	104.3
Paper and pulp payrolls *i*	......	......	105.5	97.2	104.6	98.4
Leather employment	......	......	86.6	86.0	94.0	92.1
Leather payrolls *i*	......	......	63.8	60.9	74.5	70.6
Glass employment *i*	......	......	91.6	80.7	91.9	81.6
Glass payrolls *i*	......	......	91.8	79.1	89.4	77.6
Rubber prod. employment *i*	......	......	81.2	71.4	82.1	72.7
Rubber prod. payrolls *i*	......	......	82.1	63.3	83.0	61.9
Dyeing and fin. employment *i*	......	......	112.8	101.9	114.4	103.6
Dyeing and fin. payrolls *i*	......	......	94.5	83.2	97.0	86.1
MISCELLANEOUS:						
Oils & Fats Index ('26 = 100)	53.7	60.2	54.5	60.6	53.8	61.6
Gasoline prod., bbls.	46,630	......	51,384	45,718	48,837	44,672
PAINT, VARNISH, LACQUER, FILLERS:						
Sales 680 establishments	......	......	$41,853,977	$36,827,421	$33,999,205	$34,731,597
Trade sales (580 establishments)	......	......	$25,436,932	$22,900,709	$18,862,040	$20,861,998
Industrial sales, total	......	......	$12,578,360	$10,135,607	$11,843,829	$10,392,797
Paint & Varnish, employ. *i*	119.3	113.0	118.4	114.9	117.6	114.2
Paint & Varnish, payrolls *i*	126.9	115.6	127.2	119.5	123.2	114.1

a Bureau of Mines; *b* Crude and refined plus motor benzol, Bureau of Mines; *c* Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly; *d* 000 omitted, Bureau of Foreign & Domestic Commerce; *e* Expressed in equivalent tons of 16% A.P.A.; *f* 000,000 omitted at end of month; *i* U. S. Dept. of Labor, 3 year average, 1923-25 = 100; *j* 000 omitted, 37 states; *p* Rayon Organon, formerly an index was given, now the exact poundage is given; *q* 680 establishments, Bureau of the Census; *r* Classified sales, 580 establishments, Bureau of the Census; *s* 53 manufacturers, Bureau of the Census; *t* 384 identical manufacturers, Bureau of the Census, quantity expressed in dozen pairs; *v* In thousands of bbls., Bureau of the Census; ** Indices, Survey of Current Business, U. S. Dept. of Commerce; *z* Units are millions of lbs.; ‡ 000 omitted.

Price Trend of Representative Chemical Company Stocks

	July 1	July 8	July 15	July 22	July 29	July 31	Net gain or loss last mo.	Price on July 30, 1938	1939 High	1939 Low
Air Reduction	48¾	48¾	50½	58¼	55	54¼	+ 5½	61	65⅝	53
Allied Chemical	158	160	167	171¾	172	172	+14	177	193	151½
Amer. Agric. Chem.	18	17¾	18½	18½	17¾	17¼	— ¾	24⅛*	24¼	16
Amer. Cyanamid "B"	24	24⅜	25⅝	....	27⅞	27	+ 3	81	28⅜	18⅜
Columbian Carbon	87	89⅝	91½	94	92	92	+ 5	92**	94	73
Commercial Solvents	9⅜	9⅛	9⅝	11⅞	11¾	11¼	+ 2⅛	11¾	13¾	9
Dow Chemical	116	118	125	129	126	124½	+ 8½	135*	135	101½
Du Pont	149½	149⅛	149¾	158½	159⅞	159¼	+ 9¾	126¾	160	126¼
Hercules Powder	67½	68	72	73¾	72⅞	72⅞	+ 5⅜	60⅛*	86	63
Mathieson Alkali	23¼	23¾	25	25½	24	24⅝	+ 1⅜	28¼	36	23
Monsanto Chemical	96	96½	98¼	103⅞	....	103¼	+ 7¼	89⅜	111	85¾
Std. of N. J.	41½	41¾	43	43¾	42¾	41¾	+ ¼	89⅜	53¼	40⅛
Texas Gulf Sulphur	26½	27½	27¾	30	29⅛	29	+ 2½	57	32⅝	26¼
Union Carbide	73½	75	78½	83½	83	82½	+ 9	83¼	90½	65½
U. S. Ind. Alcohol	14⅜	14½	15¾	18⅛	17	17¾	+ 3⅜	20¾	25¾	13½

* Friday, July 29.
** Wednesday, July 27.

Earnings Statements Summarized

Company:	Annual dividends	Net income 1939	Net income 1938	Common share earnings 1939	Common share earnings 1938	Surplus after dividends 1939	Surplus after dividends 1938
Air Reduction Co.:							
June 30 quarter	y$1.25	$1,205,340	$888,757	$.47	$.35	......	......
Six months, June 30	y1.25	2,232,595	1,684,347	.87	.66	......	......
American Cyanamid Co.:							
**June 30 quarter	.60	1,109,236	430,572	c.41	c.16	......	......
Six months, June 30	.60	2,149,714	524,649	c.80	c.19	......	......
American Maize-Products Co.:							
Six months, June 30	y1.00	208,436	164,609	.69	.54	......	......
Atlas Powder Co.:							
June 30 quarter	y2.25	229,306	251,145	.58	.66	......	......
Six months, June 30	y2.25	449,913	467,651	1.12	1.19	......	......
Colgate-Palmolive-Peet Co.:							
Six months June 30	y.62½	2,427,093	1,646,421	.88	.47	......	......
Commercial Solvents Corp.:							
June 30 quarter	f...	240,058	†167,055	.09	...	......	......
Six months, June 30	f...	438,100	†381,503	.16	...	......	......
Consol. Chemical Industries:							
June 30 quarter	f...	113,432	64,897	a.40	a.23	......	......
Six months, June 30	f...	216,217	166,755	a.77	a.59	......	......
Corn Products Refining:							
June 30 quarter	3.00	2,201,335	2,123,830	.70	.67	......	......
Six months, June 30	3.00	4,204,693	5,046,623	1.32	1.65	d$450,390	$391,540
Dow Chemical Co.:							
Year, May 31	y3.00	4,178,485	3,895,269	j3.95	h3.91	......	......
E. I. du Pont de Nemours & Co.:							
June 30 quarter	y4.75	20,796,159	9,877,003	1.73	.71	4,770,104	2,151,536
Six months, June 30	y4.75	39,871,535	18,937,605	3.28	1.36	7,816,961	3,485,636
Freeport Sulphur Co.:							
June 30 quarter	y1.25	338,530	437,359	.42	.54	......	......
Six months, June 30	y1.25	654,995	865,299	.82	1.06	......	......
General Printing Ink Corp.:							
**June 30 quarter	y.50	199,247	164,932	.20	.15	......	......
Six months, June 30	y.50	425,187	335,096	.44	.31	......	......
Hercules Powder Co.:							
June 30 quarter	y1.65	1,182,148	571,107	.79	.33	......	......
Six months, June 30	y1.65	2,269,470	1,227,134	1.52	.73	......	......
Koppers Co.:							
Twelve months, June 30	...	1,270,139	2,481,076	p.635	p12.40	......	......
Liquid Carbonic Corp.:							
June 30 quarter	y1.05	747,716	594,781	1.07	.85	......	......
Nine months, June 30	y1.05	441,401	696,985	.63	.99	......	......
Mathieson Alkali Works:							
June 30 quarter	1.50	174,098	193,152	.16	.18	......	......
Six months, June 30	1.50	336,046	365,552	.31	.34	......	......
Monsanto Chemical Co.:							
June 30 quarter	2.00	1,040,678	555,424	.72	.37	......	......
Six months, June 30	2.00	2,280,577	1,224,734	1.60	.85	......	......
Newport Industries, Inc.:							
June 30 quarter	f...	113,199	†52,720	.18	...	......	......
Six months, June 30	f...	182,186	†14,214	.29	...	......	......
Twelve months, June 30	f...	155,788	410,408	.25	.79	......	......
Parker Rust-Proof Co.:							
June 30 quarter	y.97½	203,948	94,378	.47	.22	......	......
‡‡Six months, June 30	y.97½	455,941	211,562	1.06	.49	......	......
Procter & Gamble Co.:							
June 30 quarter	§2.00	6,930,753	5,254,048	h1.04	h.79	......	......
Year, June 30	§2.00	25,399,792	17,439,194	h3.86	h2.59	......	......
Texas Gulf Sulphur:							
June 30 quarter	2.00	1,830,361	1,875,443	.48	.49	d89,639	d44,557
Six months, June 30	2.00	3,264,826	3,715,130	.85	.97	d575,174	d124,870
Twelve months, June 30	2.00	6,513,329	9,426,963	1.70	2.45	......	......
Union Carbide & Carbon Corp.:							
June 30 quarter	y1.80	5,457,519	3,721,725	.60	.41	......	......
Six months, June 30	y1.80	10,751,404	7,931,058	1.18	.88	......	......
U. S. Industrial Alcohol Co.:							
Six months, June 30	f...	2,314	4,255	...	.01	......	......
Victor Chemical Works:							
June 30 quarter	y1.05	203,368	119,297	.29	.17	......	......
Six months, June 30	y1.05	436,983	275,544	.62	.39	......	......
Westvaco Chlorine Products Corp.:							
June 30 quarter	1.00	275,649	180,624	.60	.32	......	......
‡‡Six months, June 30	1.00	520,712	354,461	1.11	.62	......	......

† Net loss; § plus extras; *a* on Class A shares; *b* on Class B shares; *d* deficit; *f* no common dividend; *h* on shares outstanding at close of respective periods; *j* on average no. of shares *y* amount paid or payable in 12 mos. to and including the payable date of the most recent dividend announcement; ‡‡ indicated earnings as compiled from company's quarterly reports ;** indicated quarterly earnings as shown by comparison of company's reports for first quarter of fiscal year and the six months period; *c* on combined Class A and Class B shares; *p* on preferred stock.

Chemical Stocks Rally

The wave of optimism that came on in mid-July pushed many stocks further upwards than they had been for four or five months. One or two of the stronger issues, such as American Cyanamid "B" and Du Pont common, were on the point of establishing new records for the year.

Profits Increase in 2nd Quarter

Second quarter earnings for practically all of the firms listed in the earnings statement on this page indicate that business was slightly better for the chemical industry in April, May, and June. Compared with statements for the corresponding receipts of 1938, midsummer incomes in the chemical group show a much improved situation, for not a single net loss is recorded in the mid-year statement.

Dividends and Dates

Name	*Div.*	*Stock Record*	*Payable*
Archer-Daniels-Midland, pf., q.	$1.75	July 21	Aug. 1
Atlas Powder, pf., q.	$1.25	July 20	Aug. 1
Bon Ami, Class A, q.	$1.00	July 15	July 31
Bon Ami, Cl. B, q.	62½c	July 15	July 31
Colgate-Palmolive-Peet, q.	12½c	July 25	Aug. 15
Colgate-Palmolive-Peet, pf., q.	$1.50	Sept. 5	Oct. 1
Consol. Chem. Ind., Cl. A, q.	37½c	July 15	Aug. 1
Diamond Match Co.	50c	Aug. 10	Sept. 1
Diamond Match Co.	25c	Nov. 10	Dec. 1
Diamond Match Co., pf., q.	75c	Aug. 10	Sept. 1
Dow Chemical	75c	July 29	Aug. 15
Dow Chemical, pf., q.	$1.25	July 29	Aug. 15
Freeport Sulphur, q.	25c	Aug. 15	Sept. 1
Hercules Powder, pf., q.	$1.50	Aug. 4	Aug. 15
Interchemical Corp., pf., q.	$1.50	July 20	Aug. 1
Masonite Corp., q.	25c	Aug. 18	Sept. 10
Masonite Corp., pf. q.	$1.25	Aug. 18	Sept. 1
Merck & Co.	25c	Sept. 20	Oct. 1
Merck & Co., 6% pf., q.	$1.50	Sept. 20	Oct. 1
Monsanto Chem., pf. A, s.	$2.25	Nov. 10	Dec. 1
Monsanto Chem., pf. B, s.	$2.25	Nov. 10	Dec. 1
National Lead	12½c	Sept. 15	Sept. 30
National Lead, pf. A, q.	$1.75	Sept. 1	Sept. 15
National Lead, pf. B, q.	$1.50	July 21	Aug. 1
National Lead, pf. B, q.	$1.50	Oct. 20	Nov. 1
Parker Rust-Proof, q.	25c	Aug. 10	Sept. 1
Penn. Salt. Mfg., q.	$1.25	Aug. 31	Sept. 15
Procter & Gamble, q.	50c	July 25	Aug. 15
Quaker Oats, pf., q.	$1.50	Aug. 1	Aug. 31
St. Joseph Lead	25c	Sept. 8	Sept. 20
Sherwin-Williams	$1.00	July 31	Aug. 15
Sherwin-Williams, pf.	$1.25	Aug. 15	Sept. 1
Skelly Oil, 6% cum. pf., q.	$1.50	July 5	Aug. 1
Std. Whole's. Phos. & Acid Wks., q.	20c	Sept. 5	Sept. 15
Sylvania Industrial, q.	25c	Aug. 11	Aug. 22
Texas Gulf Sulphur, q.	50c	Sept. 1	Sept. 15
Tubize Chatillon, 7% pf., ac.	$1.75	Aug. 20	Sept. 1
Westvaco Chlorine Prods., pf., q.	37½c	July 10	Aug. 1

(E) extra; (i) interim; (s) semi-annual.

Chemical Finances
July 1939—p. 40

Chemical Stocks and Bonds

Price Range July 1939 Last	July 1939 High	July 1939 Low	1938 High	1938 Low	1937 High	1937 Low	Sales: Number of shares July 1939	Sales: 1939	Stocks	Par $	Shares Listed	Dividends*	Earnings** $-per-share-$ 1938	1937	1936
NEW YORK STOCK EXCHANGE															
64¼	65	53	61	46¼	55	46	4,300	22,700	Abbott Labs.	No	640,000	$1.70	2.43	2.51	2.21
54¼	65⅝	45¼	67⅞	40	80¼	44½	17,400	122,200	Air Reduction	No	2,563,992	1.50	1.47	2.86	2.79
172	193	151½	197	124	258½	145	8,500	65,700	Allied Chem & Dye	No	2,214,099	6.00	5.92	11.19	11.44
17¾	24¼	16	28½	22	33¾	17⅞	1,900	31,500	Amer. Agric. Chem	No	627,987	1.43	2.23	2.95	1.57
7½	11⅛	5¾	15	9	30¾	8¼	3,200	34,600	Amer. Com. Alcohol	No	260,930	....	—2.05	3.23	4.55
27½	29½	21	31½	20	46	22	2,600	12,800	Archer-Dan.-Midland	No	545,416	1.25	.43	5.03	3.05
55	66¾	50⅝	68	36	94	38	600	7,300	Atlas Powder Co.	No	249,163	2.25	2.69	4.40	4.21
119	127	116	126¼	105	133	101	80	1,570	5% conv. cum. pfd.	100	68,597	5.00	14.77	20.90	20.85
27¼	28¼	13⅝	26⅝	9	41¼	13	135,300	439,300	Celanese Corp. Amer.	No	1,000,000	....	.26	2.04	2.33
107¾	109	84	96	82	115	90	3,130	8,200	prior pfd.	100	164,818	7.00	15.05	27.07	27.25
16¼	17¼	11½	17	7⅛	25¾	8½	95,000	361,400	Colgate-Palm.-Peet	No	1,962,087	.25	1.77	—.35	1.40
105¾	107	101⅞	104¼	78	104½	95	500	9,100	6% pfd.	100	233,098	6.00	21.12	3.21	17.13
92	94	73	98½	53¾	125¾	65	2,700	22,700	Columbian Carbon	No	537,406	4.00	5.13	8.31	7.48
11¼	13¾	9	12¼	5⅞	21¼	5	80,500	750,700	Commercial Solvents	No	2,636,878	....	—.11	.60	.85
62	66⅞	54⅞	70¾	53	71¼	50½	16,800	108,200	Corn Products	25	2,530,000	3.00	3.18	2.52	3.86
176	176¾	171	177	162	171½	153	800	4,700	7% cum. pfd.	100	245,738	7.00	39.69	32.96	46.76
24½	32⅜	18⅛	40⅞	25	76⅛	29½	1,370	12,180	Devoe & Rayn. A.	No	95,000	2.00	—1.72	4.05	4.49
124½	135	101½	141	87⅞	159¼	79½	4,200	38,300	Dow Chemical	No	945,000	3.00	3.91	4.15	4.48
159¼	160	126¼	154¾	90½	180⅛	98	50,600	294,300	DuPont de Nemours	20	11,065,762	3.25	3.74	7.37	7.54
120½	123⅛	117½	120½	109½	112	107½	700	8,300	4½% pfd.	No	500.000	4.50	87.27	165.48	......
131¼	142	129½	138½	130¾	135½	130	6,000	25,100	6% cum. deb.	100	1,092,948	6.00	45.92	81.70	84.21
171¼	186⅛	138⅛	187	121½	198	144	15,300	170,700	Eastman Kodak	No	2,250,921	6.50	7.54	9.76	8.23
173	183½	173	173	157	164	150	200	1,840	6% cum.	100	61,657	6.00	281.22	362.45	306,64
23	30	18¼	32	19⅞	32¼	18	8,800	73,800	Freeport Texas	10	796,380	2.00	1.87	3.30	2.43
9	10⅞	7	12⅛	6¾	19	8½	4,200	67,200	Gen. Printing Ink	1	735,960	.50	.62	1.32	1.32
18½	24½	14¾	28½	13	51½	19⅛	8,900	82,600	Glidden Co.	No	829,989	.50	—.29	2.62	3.29
44	47	34	51½	37	58⅛	43	300	4,800	4½% cum. pfd.	50	199,940	2.25	1.03	12.72	15.43
109¾	110	93	111	76¾	117½	80⅛	2,400	11,100	Hazel Atlas	25	434,409	5.00	4.97	6.67	6.55
72⅞	86	63	87	42¾	92½	50	10,200	62,100	Hercules Powder	No	1,316,710	1.50	1.95	2.97	3.24
130	135½	128½	135¼	126¾	135½	125	410	3,860	6% cum. pfd.	100	96,194	6.00	35.31	50.75	48.97
27¼	29½	16¾	30⅜	14⅜	47½	15	34,800	133,700	Industrial Rayon	No	759,325	.25	.24	.34	2.24
32½	33¼	17½	34½	15	64¼	20	9,000	39,800	Interchem.	No	289,618	....	.32	1.44	3.02
106½	106½	90	98	80	111½	92	270	4,250	6% pfd.	100	65,661	6.00	7.39	12.26	18.97
1⅞	3⅛	1½	3⅞	2	9⅛	2	2,600	26,400	Intern. Agricul.	No	436,048	....		.16	—1.55
22	27⅝	16	29	15	63½	18¼	1,400	5,900	7% cum. pfd.	100	100,000	2.00	7.01	7.70	.23
50⅛	55¾	42¾	57⅝	36⅞	73⅜	37	92,200	743,900	Intern. Nickel	No	14,584.025	2.00	2.09	3.31	2.40
31	34	29	30¼	19½	28¾	19½	3,600	11,900	Intern. Salt	No	240,000	2.00	2.29	2.11	1.70
17¼	21½	14½	24	19⅛	36	19¼	800	6,800	Kellogg (Spencer)	No	509,213	1.40	.71	2.81	2.62
50½	56¾	36½	58⅜	23¼	79	33⅝	26,500	153,100	Libbey Owens Ford	No	2,509,750	1.25	1.57	4.19	4.14
17	19	13½	21½	12⅛	26⅞	14	8,300	49,800	Liquid Carbonic	No	700,000	1.25	1.81	2.37	1.58
24⅝	36	23	36⅞	19¾	41¾	22	8,700	50,600	Mathieson Alkali	No	828,171	1.50	1.01	1.81	1.76
103¼	111	85¾	110	67	107½	71	11,500	68,700	Monsanto Chem.	No	1,241,816	2.00	2.35	4.40	4.01
117½	121	115	117½	111	109	105	80	2,080	4½% pfd. A	No	50,000	4.50	31.51	49.99	......
120½	122½	118	...	...	...	...	300	6,660	4½% pfd. B	No	50,000	4.50	31.51	49.99	......
22⅝	27½	17⅞	31	17⅛	44	18	38,800	222,900	National Lead	10	3,095,100	.50	.75	.95	1.71
171½	172½	165	178½	154	171	153	900	3,700	7% cum, "A" pfd.	100	213,793	7.00	26.03	22.86	33.83
143½	145	135	145½	127	150	127	820	4,630	6% cum. "B" pfd.	100	103,277	6.00	35.97	43.77	74.50
12⅛	17⅛	8½	19½	9⅞	41¾	10⅛	33,300	200,400	Newport Industries	1	621,359	....	—.08	2.22	.99
66	70	50	76¼	40	103¾	51¼	16,100	112,400	Owens-Illinois Glass	12.50	2,661,204	1.50	2.02	3.51	3.80
61½	62	50⅝	59	39½	65½	43¼	24,500	143,700	Procter & Gamble	No	6,325,087	2.00	2.59	4.08	2.39
118	119¾	112	122¼	114	118½	114½	1,180	12,190	5% pfd.	100	169,517	5.00	101.81	157.05	94.14
11	15⅛	10⅛	18⅜	10	34¾	14⅞	15,100	112,000	Shell Union Oil	No	13,070,625	.70	.70	1.44	1.35
103½	107	101	106½	93	105⅜	91	2,200	13,400	5½% cum. pfd.	100	341,000	5.50	33.18	60.59	57.20
19	29½	18¼	34¾	18½	60⅝	26½	6,900	59,000	Skelly Oil	No	995,349	1.00	2.27	6.07	4.42
94½	96	92	98	84	102¼	88	300	3,500	6% cum. pfd.	100	64,500	6.00	41.09	97.86	73.16
25½	29⅛	23¼	35½	24¾	50	26½	35,600	311,400	S. O. Indiana	25	15,272,020	1.00	1.82	3.16	3.09
41¾	53¼	40⅛	58⅜	39¾	76	42	81,100	534,300	S. O. New Jersey	25	26,618,065	1.50	2.86	5.64	3.73
5⅝	6½	4	8	3⅞	15⅜	5¼	11,600	75,100	Tenn. Corp.	5	853,696	....	.46	1.09	.41
36¾	48¼	34⅞	49⅝	37⅝	65⅛	34¾	54,000	462,700	Texas Corp.	25	10,876,882	2.00	2.13	5.02	4.10
29	32⅝	26¼	38	26	44	23¾	15,100	129,100	Texas Gulf Sulphur	No	3,840,000	2.00	1.81	3.02	2.57
82½	90½	65½	90⅞	57	111	61¼	52,800	355,500	Union Carbide & Carbon	No	9,073,288	2.40	2.77	4.81	4.09
64	65¾	52	73½	39	91	36¾	2,700	27,500	United Carbon	No	397,885	3.25	3.78	5.91	5.54
17¾	25¾	13½	30¼	13½	43⅝	16⅛	8,000	61,400	U. S. Indus. Alcohol	No	391,238	....	—1.08	1.24	—.20
24½	30¼	16	28⅞	11½	39⅜	9¼	25,800	179,800	Vanadium Corp. Amer.	No	376,637	....	.61	2.22	.40
24¾	25⅞	18¼	25¼	13½	...	...	3,900	46,100	Victor Chem.	5	696,000	.90	1.05	1.01	1.16
2¾	4⅞	2½	5⅝	2¾	12¾	2⅛	4,900	49,900	Virginia-Caro. Chem.	No	486,122	....	—1.80	—.05	—2.44
21¾	31⅞	17	32⅛	15¾	74⅜	18½	3,200	36,000	6% cum. part. pfd.	100	213,052	....	1.90	5.88	.44
25¼	25⅜	15¼	20⅛	10	27¼	10¾	5,600	26,100	Westvaco Chlorine	No	339,362	1.00	1.52	1.46	1.17
34½	34½	29	31½	20	34⅞	21⅛	1,500	11,600	cum. pfd.	30	192,000	1.50	4.19	4.09	3.26
NEW YORK CURB EXCHANGE															
27	28⅜	18⅜	30¼	15½	37	17⅝	34,900	208,400	Amer. Cyanamid "B"	10	2,520,368	.45	.91	2.09	1.77
105	106	76	92	50	124	69	2,475	6,835	Celanese, 7% cum. 1st pfd.	100	148,179	8.53	8.95	22.32	24.47
4⅛	5¼	3	6¾	3	15	3	700	3,925	Celluloid Corp.	15	194,952	....	—2.73	—.92	—.80
7⅜	7⅜	4¾	12	6½	14⅝	10½	1,200	2,500	Courtauld's Ltd.	£1	24,000,000	.29	.26%	8.64%	8.30%
6	7	5	9⅞	6	10⅝	3½	700	7,000	Duval Texas Sulphur	No	500,000	....	.71	.43	.61
40½	41½	30	41⅛	27	47½	31	500	3,800	Heyden Chem. Corp.	100	149,643	1.50	2.07	3.94	3.56
114	117	90	115½	55	147½	77	3,900	38,500	Pittsburgh Plate Glass	25	2,142,443	1.75	3.00	8.53	7.15
98½	113½	83	117¾	66	154¾	72¼	2,700	24,400	Sherwin Williams	25	638,927	2.50	2.43	8.76	8.04
112	115¾	107¼	114⅛	107	114	106¼	200	1,430	5% cum. pfd.	50	132,189	5.00	8.76	45.50	41.44
PHILADELPHIA STOCK EXCHANGE															
150	167	135	167	121½	179	115	300	1,250	Pennsylvania Salt	50	150,000	4.50	6.90	11.79	8.57

Price Range July 1939 Last	July 1939 High	July 1939 Low	1938 High	1938 Low	1937 High	1937 Low	Sales July 1939	Sales 1939	Bonds	Date Due	Int. %	Int. Period	Outstanding $
NEW YORK STOCK EXCHANGE													
102¾	103½	100¾	105⅜	99⅛	109½	99	221,000	1,882,000	Amer. I. G. Chem. Conv.	1949	5½	M-N	$25,300,000
26½	28½	19	38	25⅛	42½	23	90,000	449,000	Anglo Chilean Nitrate inc. deb.	1967	4½-5	J	12,067,000
105⅝	108⅜	104	106⅛	102⅜	102⅞	100⅛	20,000	177,000	Dow Chemical	1951	3	J-D	5,000,000
103	103½	99⅞	102¾	100	102	98½	18,000	162,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5	M-N	5,633,000
26¼	27½	21½	35⅜	24¾	35⅜	21¼	86,000	935,000	Lautaro Nitrate n inc. deb.	1975	4	J-D	30,500,000
28	35	28	35⅜	24¾	25½	20½	......	4,000	Ruhr Chem.	1948	6	A-D	1,500,000
102¾	106	102¾	105	96½	102	93	314,000	2,302,000	Shell Union Oil	1951	3½	M-S	58,800,000
104	105	102¾	104⅜	90¼	102¾	94	39,000	527,000	Skelly Oil	1951	4	J-J	9,000,000
105⅜	106¼	103⅛	105⅜	100	102	95	166,000	2,682,000	Standard Oil Co. (New Jersey) deb.	1961	3	J-D	85,000,000
106	106½	103	103	98	...	...	262,000	1,834,000	Standard Oil Co. (New Jersey) deb.	1953	2¾	J-J	50,000,000
105⅝	108⅝	104	103	95	105	93½	179,000	2,584,000	Texas Corp.	1951	3½	J-D	60,000,000
105½	105½	103¾					523,000	1,021,000	Texas Corp.	1959	3	A-O	40,000,000
101¼	103½	96	101	77	111	81	25,000	354,000	Vanadium Corp. conv.	1941	5	A-O	2,800,000

* Paid in 1938, including extras but excluding dividends paid in stock. ** For either fiscal or calendar year.

Dyes in 1938

Preliminary figures for the U. S. production and sale of dyes and other synthetic organic chemicals in '38, issued by the U. S. Tariff Commission show that total sales of all products decreased 13%, from $284,000,000 in 1937, a year of peak chemical sales, to $246,000,000 in '38. The decline in coal-tar chemicals was 21%, from $164,000,000 in '37 to $130,000,000 in '38, and in non-coal-tar synthetics 3%, from $119,000,000 in '37 to $116,000,000 in '38. Coal-tar resins and dyes were the groups that fell off most severely in sales value. Sales of non-coal-tar resins increased.

The generally greater decline in production than in sales, both by quantity and value, indicates that during '38 producers of synthetic organic chemicals reduced inventories carried over from '37.

A substantial part of the output of synthetic organic chemicals is consumed by the producers in further processing. This is especially the case in certain groups. More than half of the coal-tar intermediates, and non-coal-tar chemicals, and about a fifth of the coal-tar resins and medicinals are consumed by the producing concerns.

Intermediates 30% Below '37 Level

The production of 402,000,000 lbs. of coal-tar intermediates in '38 was 30% under that in '37. Phenol and phthalic anhydride, both used in large quantities in manufacturing synthetic resins, were off 32% and 39%, respectively, in output. Aniline oil and refined naphthalene were down almost as much. Contrary to the general trend, the 13,000,000 lbs. of p-dichlorobenzene made in '38 was almost 12% more than in '37. The production of most of the intermediates used in making dyes was considerably less in '38.

The output of 81,000,000 lbs. of dyes is 33% less than in '37. Sales decreased 26% in quantity and 18% in value. Sales of unclassified dyes, continuing to increase in importance, were 32% of the sales value of all dyes as compared with 30% in the preceding year. The outstanding changes in the dye trade in '38 were decreases in sales of sulfur black from 14,000,000 lbs. in '37 to 8,000,000 lbs. in '38, and of synthetic indigo from 18,000,000 lbs. to 12,000,000 lbs. during the same period. Drastic curtailment in our dye export trade with China is a primary cause of the lessened sales of these and similar cheap, bulk colors, according to the Tariff Commission. Unusually heavy losses in sales of these cheap colors coupled with generally satisfactory and, in some instances, increased sales of the

Comparison of U. S. Production and Sales of Dyes and Other Synthetic Organic Chemicals, 1925-30, 1936, and 1937

Coal-tar chemicals		1925-30 average	1937	1938	% Decrease, 1938 from 1937
Intermediates:					
Production	Thousands of pounds	267,492	575,893	401,943	30.2
Sales	Thousands of pounds	109,133	242,194	171,514	29.2
Sales value	Thousands of dollars	22,408	35,639	26,090	26.8
Finished coal-tar products:[1]					
Production	Thousands of pounds	138,078	371,124[3]	275,203	26.2
Sales	Thousands of pounds	133,964	313,797[3]	244,066	22.7
Sales value	Thousands of dollars	65,027	127,414[3]	103,769	19.4
Dyes:					
Production	Thousands of pounds	94,003	122,208	81,326	33.5
Sales	Thousands of pounds	92,207	118,010	87,284	26.0
Sales value	Thousands of dollars	39,428	64,531	53,011	18.0
Medicinals:					
Production	Thousands of pounds	4,508	14,800	11,097	25.0
Sales	Thousands of pounds	4,106	11,989	8,885	25.9
Sales value	Thousands of dollars	7,464	11,496	9,509	17.3
Flavors and perfume materials:					
Production	Thousands of pounds	3,966	4,348	3,795	12.9
Sales	Thousands of pounds	3,919	3,899	3,618	7.4
Sales value	Thousands of dollars	2,901	3,967	3,283	17.6
Coal-tar resins:					
Production	Thousands of pounds	24,442[3]	141,099[2]	106,923	24.7
Sales	Thousands of pounds	22,135[3]	108,284[2]	84,763	22.4
Sales value	Thousands of dollars	7,756[3]	20,165[2]	15,811	23.2
Non-coal-tar chemicals					
Production	Thousands of pounds	379,972	2,523,893	2,409,418	4.8
Sales	Thousands of pounds	264,006	1,168,058	1,121,569	4.0
Sales value	Thousands of dollars	44,499	119,375	115,933	2.9

[1] Includes color lakes, rubber chemicals and miscellaneous coal-tar products not shown separately.

[2] Does not include resins from adipic acid, coumarone and indene, hydrocarbons, styrol, succinic acid and sulfonamides.

[3] 1927-30 average.

U. S. Production and Sales of Certain Synthetic Resins, 1938

	Production	Sales		
	Pounds	Pounds	Value	Unit value
(A) Coal-tar: Total	**106,923,244**	**84,763,503**	**$15,810,538**	**$0.19**
Alkyd resins:				
Maleic anhydride	3,432,887	2,978,718	634,935	.21
Phthalic anhydride	37,563,840	21,931,783	4,467,466	.20
Derived from tar acids:				
Cresols or cresylic acid	5,284,895	3,882,988	561,432	.14
Phenol:				
For molding	13,487,681	12,787,051	2,189,600	.17
For casting	4,807,671	4,651,991	1,896,425	.41
Other	17,658,391	17,484,415	2,939,971	.17
Xylenols	329,927	....	....	..
Xylenols and cresols	2,396,273	....	....	..
(B) Non-coal-tar: Total	**23,435,408**	**17,064,685**	**7,061,436**	**.41**
Urea	8,249,900	7,467,782	3,312,678	.44

U. S. Production and Sales of Certain Rubber Chemicals, 1938

	Production	Sales		
	Pounds	Pounds	Value	Unit value
(A) Coal-tar: Total	**18,771,014**	**14,662,706**	**$5,754,577**	**$0.39**
Accelerators, total	8,222,515	6,240,191	2,365,566	.38
Butyraldehyde aniline	386,294	....	....	....
Diphenylguanidine	1,144,510	1,029,901	339,157	.33
Mercaptobenzothiazole zinc salt	516,049	480,211	219,672	.46
Thiocarbanilide	229,143	....	....	....
Antioxidants, total	10,548,499	8,422,515	3,389,011	.40
Diphenyl-p-phenylenediamine	574,999	....	....	....
(B) Non-coal-tar				
Accelerators:				
Tetramethylthiouram sulfide and disulfide	260,388	217,111	470,389	2.17

Dyes, Synthetic Chemicals, 1938

Production, Sales, p. 4

U. S. Production and Sales of Certain Miscellaneous Synthetic Chemical Products, 1938

	Production	Sales		
	Pounds	Pounds	Value	Unit value
(A) Coal-tar: Total	39,424,372	32,735,729	$7,382,406	$0.23
Photographic chemicals: Total	1,800,207	1,415,911	1,585,051	1.12
Hydroquinol	1,246,671	1,123,063	968,820	.86
Methyl p-amonophenol sulfate (metol) (rhodol)	214,628	215,462	536,116	2.49
Phthalates: Total	10,428,947	8,149,826	1,658,749	.20
Dibutyl	4,206,475	3,346,921	606,536	.18
Diethyl	870,283	746,975	135,174	.18
Textile chemicals: Total	5,622,096	4,769,154	1,123,890	.24
(B) Non-coal-tar: Total[1]	2,383,167,683	1,102,108,069	105,882,717	.10
Acetic acid (100% purity)	97,478,563	....	....	....
Acetic anhydride (100% purity)	114,835,504	....	....	....
Acetone	....	67,041,184	2,887,374	.04
Amines (mono, di, tri)	302,053	228,388	115,542	.51
Amyl acetates, total	5,828,497	6,393,792	679,398	.11
Amyl alcohols, total	9,096,977	....	....	....
Butyl acetates, total	55,792,217	43,334,733	3,571,662	.08
Butyl alcohols, total	81,304,789	30,220,372	2,376,175	.08
Carbon tetrachloride	77,975,057	70,383,429	2,860,288	.04
Chloroform (tech and USP)	2,159,933	1,788,816	327,198	.18
Citric acid, refined (fermentation)	10,277,234	10,406,354	2,421,922	.23
Diacetone alcohol	2,382,481	1,776,275	163,272	.09
Dibutyl tartrate	11,980	14,294	6,461	.45
Ethyl acetate (85% purity)	55,725,726	42,373,680	2,322,761	.05
Gallic acid, tech.	140,625	74,933	52,263	.70
Isopropyl alcohol (Isopropanol)	141,081,915	17,190,575	705,585	.04
Isopropyl ether	....	1,548,530	62,750	.04
Lactic acid: Edible (100%)	1,292,216	984,152	209,846	.21
Methanol (synthetic)	....	98,157,826	3,784,435	.04
Methyl chloride (100% purity)	3,064,227	3,041,642	954,267	.31
Methyl formate	....	41,629	11,045	.27
Oxalic acid	9,194,738	9,007,950	901,369	.10
Pyrogallic acid (Pyrogallol)	51,324	48,958	69,281	1.42
Sulfated fatty alcohols, acids, etc. (Gardinols, Igepons, Intramines)	7,668,458	....	....	....

[1] Includes non-coal-tar rubber chemicals.

U S. Production and Sales of Dyes and Other Finished Coal-Tar Products, 1938

(In thousands)

	Production	Sales		
	Pounds	Pounds	Value	Unit value per lb.
Dyes:				
Classified	67,589	73,190	$36,094	$0.49
Unclassified	13,737	14,094	16,917	1.20
Total	81,326	87,284	53,011	.61
Color lakes and toners	13,867	12,118	9,018	.74
Medicinals	11,097	8,885	9,509	1.07
Flavors and perfume materials	3,795	3,618	3,283	.91
Resins	106,923	84,763	15,811	.19
Rubber chemicals	18,771	14,662	5,755	.39
Miscellaneous chemicals[1]	39,424	32,736	7,382	.23
Total	275,203	244,066	103,769	.43

[1] Includes benzoates of ammonia and soda, benzoyl peroxide, biol. stains and chem. indicators, poisonous and tear gases; synthetic insecticides, phthalates, and tanning materials; and others.

Summary of Production, Sales of Synthetic Organic Chemicals of Non-Coal-Tar Origin, 1938, U. S.

(In thousands)

	Production	Sales		
	Pounds	Pounds	Value	Unit value per lb.
Medicinals	1,379	1,137	$2,278	$2.00
Flavors and perfume materials	1,436	1,259	711	.56
Resins	23,435	17,065	7,061	.41
Miscellaneous[1]	2,383,168	1,102,108	105,883	.10
Total	2,409,418	1,121,569	115,933	.10

[1] Includes non-coal-tar rubber chemicals and all other non-coal-tar organic chemicals.

relatively high-priced vat colors and azoic dyes resulted in an increase in the average unit value of sales of all dyes from 55c per lb. in '37 to 61c per lb. in '38.

Color lakes and toners decreased 23% in production, 21% in sales quantity, and 24% in sales value in '38.

Coal-tar flavor and perfume materials decreased 13% in production, 7% in quantity of sales, and 18% in value of sales in '38 as compared with '37; those not derived from coal tar were off 20% in production, 19% in quantity of sales, and 31% in value of sales.

The decline in synthetic resins was in those of coal-tar origin, which were 25% less in production, 107,000,000 lbs. in '38, and 23% less in value of sales, $16,000,000 in '38, than in '37. Non-coal-tar resins increased 11% in production to 23,000,000 lbs., and 24% in value of sales to $7,000,000, partly as a result of commercial production of the relatively high-priced vinyl acetals for use in safety glass manufacture. Resins derived from urea are shown separately for the first time.

Synthetics for use in compounding rubber were off about ⅓ in output; accelerators declined more than did other rubber chemicals. In the miscellaneous coal-tar chemicals group, photographic chemicals increased slightly in production, and sales value. The output of textile chemicals was 6,000,000 lbs., 83% more than in '37. Sales increased proportionately. The production of 10,000,000 lbs. of phthalates in '38 was 31% less than in the preceding year.

The output of miscellaneous non-coal-tar synthetics in '38 was 2,383,000,000 lbs., 5% less than in '37. The decrease in production of acetic acid was 22% and of acetic anhydride 35%. Sales of acetone were slightly less than in '37. Butyl alcohol was off 35% in production. The steady upward trend in carbon tetrachloride production was broken in '38 when the output decreased 7%. Isopropyl alcohol increased 7% in production.

ACETIC ACID AND ITS DERIVATIVES: U. S.

(Millions of pounds)

	Production		
Year	From calcium acetate	By other methods	Total
1933	25.4	64.2	89.6
1934	27.0	85.2	112.2
1935	42.7	116.5	159.2
1936	35.8	139.9	175.7
1937	20.6	156.6	177.2
1938	...	...	97.5

For comparable statistics for earlier years refer to Statistical & Technical Data Section, July, '38, pages 109-110.

Carbon Black in 1938

Compared with '37, domestic sales and exports of carbon black declined 20 and 9%, respectively, states the Bureau of Mines. However, the most discouraging feature of the year was the behavior of prices, which fell to unprecedented low levels. Although production was curtailed, stocks at plants increased substantially.

As noted a year ago, carbon-black prices weakened abruptly at the end of '37. Two additional cuts in spot prices were made in Jan., '38, bringing the standard zone price to below 3c per lb., the generally accepted production cost. The average value at the plants as reported by producers declined from 3.41c in '37 to 2.41c in '38. The average export value was better maintained, but it dropped from 4.72c in '37 to 4.51c in '38.

The decline in output in '38 was quite general throughout all the producing States, Oklahoma being the chief exception. Louisiana's output showed a material decline (40%) but that of Texas nearly held its own, declining only from 421,068,000 lbs. in '37 to 417,104,000 lbs. in '38. Production in the Texas Panhandle declined in '38 for the first time since '32, but a material gain in output was recorded in West Texas.

There were 324,950,000,000 cu. ft. of natural gas burned at carbon black plants last year, compared with 341,085,000,000 in '37. Average yield of carbon black per thousand cu. ft. of gas burned was 1.47 lbs. in '38, compared with 1.50 lbs. in '37. The fall in yield reflects the decline in activity of "other" processes; in '37, these were largely responsible for the high average yield of 1.50 lbs., for one or two of them are capable of recovering as much as 10 lbs. per thousand cu. ft. of gas burned.

Sales Fall 16%

Total sales of carbon-black in '38 amounted to 411,442,000 lbs., or 16% less than in '37. Domestic sales in '38 totaled 243,474,000 lbs., or 20% less than in '37. Of the domestic sales the rubber trade took 89%, ink companies 6%, paint companies 2%, with the remaining 3% classed under sales for miscellaneous purposes. These data indicate chiefly a small increase in the relative importance of sales to rubber companies at the expense of sales for miscellaneous purposes.

Exports Down 11½%

After increasing for 3 successive years, exports of carbon-black declined in '38, when about 168,000,000 lbs. were shipped abroad, compared with about 184,000,000 lbs. in '37. The reasons for the decline in exports in '38 are obscure; probably the chief reason was a general decline in activity at rubber plants abroad rather than changes in military policy. Important gains in exports by countries were notably few last year, the outstanding being one of about 40% over '37 credited to Italy. United Kingdom continued as the leading foreign customer, with France second and Germany third. Although Germany's imports from the U. S. declined in '38, it is doubtful if this was related to the production of substitutes. The low prices for carbon-black in '38, were not conducive to substitution, even in Germany.

Carbon Black Industry, 1937, 1938

(Preliminary)

	1937	1938
Number of producers reporting	24	24
Number of plants	57	55
Quantity produced (pounds):		
Louisiana	66,381,000	39,534,000
Texas:		
Panhandle	405,247,000	382,369,000
Rest of State	15,821,000	34,735,000
Total Texas	421,068,000	417,104,000
Other States	23,157,000	20,401,000
Total United States	510,606,000	477,039,000
Produced by:		
Channel process (pounds)	444,427,000	441,284,000
Other processes[1] (pounds)	66,179,000	35,755,000
Stocks held by producers Dec. 1 (pounds)	100,497,000	166,159,000
Sales (pounds):		
Domestic:		
To rubber companies	269,584,000[2]	217,231,000
To ink companies	18,116,000	14,131,000
To paint companies	6,159,000	4,229,000
For miscellaneous purposes	11,503,000	7,883,000
Total	305,362,000[2]	243,474,000
Exports:		
United Kingdom	48,381,000[2]	44,429,000
France	29,914,000[2]	26,217,000
Germany	27,441,000[2]	23,647,000
Other	78,517,000[2]	73,675,000
Total	184,253,000[2]	167,968,000
Losses (pounds)	76,000	65,000[3]
Value (at plants) of carbon black produced:		
Total (dollars)	17,389,000	11,486,000
Average per pound (cents)	3.41	2.41
Estimated quantity of natural gas used (M cubic feet)	341,085,000	324,950,000
Average yield per M cubic feet (pounds)	1.50	1.47

[1] Roller, "special," thermatomic, and Lewis. [2] Revised. [3] Gain.
By G. R. Hopkins, Assistant Chief Economist, Petroleum Economics Division.

Lead and Zinc Pigments

Sales of lead and zinc pigments in '38 on the whole were considerably under totals for the previous year, according to the Bureau of Mines. White lead (dry and in oil) and leaded zinc oxide fared better than the others, showing declines of only 1 and 5%, respectively, from totals for '37. Sales of leaded zinc oxide in '37 were at relatively the peak level of '36, so that in '38 this pigment was far ahead of all others in relation to previous high record outputs.

Of the lead pigments, white lead in oil accounted for the only increase, sales of this product rising 9%. Sales of dry white lead, however, declined 23% so the total for the two classes was 1% below that for '37. Other decreases were: red lead 15%; litharge, 21%; basic lead sulfate, 33%; and orange mineral 37%. Production of basic lead sulfate has increased considerably in the past several years, but much of the increased tonnage has been for the manufacture of leaded zinc oxide and the amount so used has been eliminated in order to avoid duplication of metal content in reporting statistics for leaded zinc oxide. Approximately 5,500 tons of basic lead sulfate were used to increase the lead content of leaded zinc oxide in '37 and a considerably higher tonnage was reported used for that purpose in '38.

Leaded zinc oxide sales were only 6% below the record high of '36 and were 5% below the total for '37. Sales of lithopone

Pigments, Fillers, 1937-38
Carbon Black, Lead & Zinc Pigments, China Clay—p. 3

Pigments, Fillers, 1937-38

Carbon Black, Lead & Zinc Pigments, China Clay—p. 4.

declined 19% and of zinc oxide 31% from the totals of '37. Sales of zinc sulfate fell 29% from those for '37.

The most important items in foreign trade in lead and zinc pigments for the first 11 months of '38 (12 months figures for '37 shown in parentheses) were as follows: Exports of white lead (dry and in oil) amounted to 1,271 (1,236) short tons, of litharge were 1,605 (1,452) tons and of red lead were 747 (934) tons. Imports of lithopone during the same period totaled 3,585 (5,601) tons, of dry zinc oxide 546 (680) tons and of zinc oxide in oil 60 (95) tons. Exports of lithopone amounted to 1,646 (2,671) tons and of zinc oxide to 1,079 (2,953) tons.

China Clay

Sales of kaolin or china clay by domestic miners in '38 held up better than might have been expected in view of the slackened pace of consuming industries. Bureau of Mines figures show shipments of 595,054 short tons valued at $4,740,880, only 19% less than the '37 all-time record of 732,282 tons worth $5,349,636 and well above the shipments for any year prior to '36. Imports, on the other hand, were far less in '38 than in any previous year since '97, amounting to only 84,180 tons valued at $753,858, 43% less than in '37. The duty on china clay was lowered from $2.50 to $1.75 a long ton on Jan. 1, '39 but announcement of the proposed change came so late that it is doubtful whether many consumers deferred their purchases until after the end of '38 in order to take advantage of the reduction.

Average price of domestic sales in '38 was $7.97 a short ton or substantially higher than the average $7.31 for the preceding year. Some producers accepted lower prices for their paper-filled clays, and possibly for their rubber clays, but these reductions were more than offset by the higher averages reported by several producers who have notably improved the quality of their products. The main reason for this increase in the average, however, was the relatively large reduction in the shipments of low-priced refractory kaolins in Georgia, as compared with those of the more expensive kinds. For most kinds of clay, quotations remained where they were in '37.

For comparable statistics for earlier years refer to Statistical & Technical Data Section, Aug., '38, pages 233-234.

Lead and Zinc Pigments and Zinc Salts Sold by Domestic Manufacturers in the U. S., 1937-38

	1937			1938		
	Short tons	Value Total	Value Per ton	Short tons	Value Total	Value Per ton
Basic lead sulfate or sublimed lead:						
White	7,514	$ 973,214	$130	5,030	$ 555,203	$110
Blue	1,108	147,298	133	771	88,873	115
Red lead	33,931	5,429,182	160	30,183	4,121,428	137
Orange mineral	206	49,356	240	127	27,547	217
Litharge	83,902	12,033,949	143	68,711	8,359,629	122
White lead:						
Dry	32,661	4,576,337	140	28,583	3,533,452	124
In oil[1]	65,552	12,466,396	190	70,400	11,517,656	164
Zinc oxide	114,652	11,777,131	103	79,129	9,253,342	117
Leaded zinc oxide	40,343	4,190,952	104	38,216	4,072,422	107
Lithopone	154,771	12,069,790	78	125,746	9 975,012	79
Zinc sulfate	10,521	589,017	56	7,757	439,479	57

[1] Weight of white lead only, but value of paste.

Sales of Lead and Zinc Pigments, by Uses, 1937-38

	1938 Short tons	1937 Short tons
White lead (dry and in oil)		
Paints	93,788	93,580
Ceramics	1,918	2,506
Other	3,277	2,127
	98,983	98,213
Red Lead		
Storage batteries	19,057	20,275
Paints	8,698	10,440
Ceramics	655	854
Other	1,773	2,362
	30,183	33,931
Orange mineral		
Ink manufacture	20	76
Color pigments	94	51
Other	13	79
	127	206
Litharge		
Storage batteries	32,514	32,228
Insecticides	11,736	18,242
Chrome pigments	6,411	8,689
Oil refining	5,889	8,311
Ceramics	4,590	7,577
Varnish	2,449	1,865
Rubber	880	1,659
Linoleum	231	264
Other	4,011	5,067
	68,711	83,902

	1938 Short tons	1937 Short tons
Basic lead sulfate		
Paints	5,024	8,255
Rubber	91	213
Storage batteries	3	6
Other	683	148
	5,801	8,622
Lithopone		
Paint, varnish and lacquers	101,924	122,915
Floor coverings and textiles	15,400	20,194
Rubber	3,148	4,383
Other	5,274	7,279
	125,746	154,771
Zinc oxide		
Rubber	46,226	67,061
Paints	20,884	27,987
Floor coverings and textiles	3,030	9,019
Ceramics	4,908	5,216
Other	4,041	5,369
	79,129	114,652
Leaded zinc oxide		
Paints	37,348	39,584
Rubber	......	97
Other	868	662
	38,216	40,343

Kaolin Sold by U. S. Producers, 1937-38

(By uses, short tons)

Use	1937	1938
Pottery and stoneware:		
Whiteware, etc.	50,638	40,052
Chemical stoneware	....	....
Stoneware	....	....
Art pottery	200	228
Flower pots	....	....
Slip for glazing	....	....
	50,838	40,280
Tile, high-grade	17,012	11,785
Kiln furniture, etc.:		
Saggers, pins, stilts	1,522	1,335
Wads	....	....
	1,522	1,335
Architectural terra cotta	....	....
Paper:		
Filler	335,031	291,359
Coating	91,146	71,020
	426,177	362,379
Rubber	86,007	70,799
Linoleum and oilcloth	6,368	4,751
Paints:		
Filler and extender	5,343	4,294
Kalsomine	1,884	3,565
	7,227	7,859
Cement manufacture	32,788	34,238

Use	1937	1938
Refractories:		
Firebrick and block	70,414	35,951
Bauxite, high-alumina brick	....	....
Fire-clay mortar, including clay processed for laying firebrick	2,038	1,662
Other glass refractories	244	94
Zinc retorts and condensers	....	....
Foundries, steelworks	4,474	3,160
	77,170	40,867
Miscellaneous:		
Rotary-drilling mud	....	....
Artificial abrasives	....	....
Asbestos products	299	338
Chemicals	2,417	1,850
Enameling	82	....
Plaster and plaster products	3,674	3,762
Heavy clay products	1,535	60
Other Uses	19,166	14,751
	27,173	20,761
Grand Total	732,282	595,054

U. S. Chemical Patents

Off. Gaz.—Vol. 502, Nos. 3, 4, 5—Vol. 503—Vol. 504, No. 1—p. 120

A Complete Check-List of Products, Chemicals, Process Industries

Agricultural Chemicals

Poultry or stock feed, comprising a compressed mass of particles, having for binder a gel-forming aluminum hydro-silicate. No. 2,162,609. Charles Coleman Dawe, Chicago, Ill.

Manufacture of solid ammonium perphosphate. No. 2,162,655. Walter Volkel, Frankfort-on-the-Main, Germany, to Deutsche Gold und Silver Scheideanstalt, vormals Roessler, Frankfort-on-the-Main, Germany.

Preparation a feed material, comprising subjecting solvent-extracted soy bean meal containing 4.5-7.0% moisture to 2000-5000 p.s.i. for a time, and at a temperature, sufficient to disembitter and disintegrate the meal, which is then toasted. No. 2,162,729. Arthur A. Levinson, Chicago, and James L. Dickinson, Itasca, Ill., to The Glidden Co., Cleveland, Ohio.

Horticultural spray emulsion, comprising non-phytocidal mineral spray oil, a fatty acid soap soluble both in oil and water, excess fatty acid soluble in oil, a water-soluble emulsifier soap, a resinate spreader, soluble protein materials, and aqueous alkali. No. 2,162,904. John Raymond Allison, Whittier, Calif., to Union Oil Co. of California, Los Angeles, Calif.

Vehicle for plant spraying materials, comprising albumin and an alkali resinate in aqueous solution. No. 2,162,905. John R. Allison, Whittier, Calif.

Aqueous vehicle for plant spraying materials, comprising albumin, alkali resinate, and alkali oleate. No. 2,162,906. John R. Allison, Whittier, Calif.

Process fertilizing soils, consisting of passing orthophosphoric acid into irrigation water in such amounts that the acid concentration does not exceed 43 parts per million. No. 2,163,065. Ludwig Rosenstein, to Shell Development Co., both of San Francisco, Calif.

Horticultural parasiticide, consisting of a mineral oil having dispersed therein an oil gelling agent in quantity sufficient to produce incipient gellation. No. 2,163,560. William B. Parker, Placerville, Calif., to California Spray-Chemical Corp., Berkeley, Calif.

Cellulose

Preparation cellulose ethers, comprising aqueous caustic soda emulsified with inert organic diluent, which emulsion is mixed with granulated wood pulp, the whole then being treated with an etherifying agent. No. 2,161,815. Frederick C. Hahn, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Viscose-cellulose ether solution, wherein not more than 1% of the regeneratable material is an alkali-soluble cellulose ether. No. 2,162,460. Robert W. Maxwell, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture cellulose ethers in a single stage etherification. No. 2,163,869. William R. Collings and Lee De Pree, to The Dow Chemical Co., all of Midland, Mich.

Continuous process for the decomposition of woody material and the recovery of cellulose therefrom. No. 2,164,040. Fritz Offermanns, Muskau, Oberlausitz, Germany.

Chemical Specialty

Extreme pressure lubricant, comprising a lubricating oil base of viscosity index not below 80, and a Saybolt viscosity at 210 deg. F. of at least 75, a lead salt of higher fatty acid, a solubilizing agent therefor, and a sulfur compound furnishing a small amount of corrosive sulfur. No. 2,161,970. Floyd L. Miller, Roselle Park, and Charles F. Smith, Elizabeth, N. J., to Standard Oil Development Co., of Delaware.

Free-flowing, granular, detergent composition, comprising water-soluble fatty-acid soap, cresylic acid, diethylene glycol, an alkaline salt, and an absorbent, inert earthy material. No. 2,162,023. Samuel J. Miller, Boris Sway, and Edward P. Breckel, to The Du Bois Soap Co., all of Cincinnati, Ohio.

Stable liquid composition for injection into meat roasts to minimize roastage shrinkage, consisting of sterile aqueous mono-sodium glutamate with about twice its own weight of sodium chloride. No. 2,162,047. Hugh E. Allen, Evanston, Ill., one-half to Albert G. McCaleb, Evanston, Ill.

Coated wire nail, comprising regular carbon steel wire nail coated with pyroxylin-base resinous material, said film tending to increase friction between said nail and wood. No. 2,162,177. Ernest W. D. Laufer, Arlington Heights, and Clarence P. Reis, Chicago, Ill., to The American Steel and Wire Co. of New Jersey, a corp of N. J.

Water-soluble adhesive composition, comprising a mixture of animal glue, "Hydroresin," and "Rezinel." No. 2,162,194. Lewis Davis, Worcester, Mass., to McLaurin-Jones Co., Brookfield, Mass.

Lubricating oil non-corrosive to bearings of cadmium, lead, nickel, silver, or copper composition, comprising a lubricant having dissolved therein a small proportion of dianiline disulfide. No. 2,162,207. Robert C. Moran, Wenonah, and William H. James, Paulsboro, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

A transformer oil, consisting of lubricating oil containing a sludge-inhibiting amount of aniline disulfide. No. 2,162,208. Robert C. Moran, Wenonah, William H. James, Paulsboro, and Everett W. Fuller, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Cutting oil formula, comprising a substantially non-aqueous mixture of a major proportion of lubricating oil, and minor proportions of oleic acid and ammonium oleate. No. 2,162,297. Alfred E. Dahlberg, Chicago, Ill.

High temperature cement, suitable for sealing furnace joints, consisting of approximately equal parts of silicate of soda and asbestos fibre, a major amount of fire clay, and a small amount of mineral wool. No. 2,162,387. Noah B. Radabaugh, Mentor-on-the-Lake, Ohio.

A substantially non-sludging lubricating oil for internal combustion engines, a dewaxed mineral oil containing not over about 1% sulfurized sperm oil. No. 2,162,398. Frank C. Haas, Wyandotte, Mich., to Archer-Daniels-Midland Co., Minneapolis, Minn.

A straight cutting oil, comprising a major proportion of oil lubricant and a small proportion (of about ½% or more) of ammonium soaps of higher fatty acids, or derivatives thereof, oleic acid excepted. No. 2,162,454. Walter S. Guthmann, Chicago, to Production Oil Products, Inc., a corp. of Illinois.

Hair dye, a triacetyl derivative of a phenyl, or naphthyl, compound. No. 2,162,458. Erich Lehmann, Priorau, Bitterfeld, Germany, to Winthrop Chemical Co., Inc., New York City.

Aerated, water-containing food product, containing a dispersed hard fat, a water-absorbent bodier; the whole forming a plastic mass capable of retaining ingested air. No. 2,162,585. Albert Musher, New York City, to Musher Corp., Elizabeth, N. J.

Fire-retarding preparation for treating cellulosic materials, comprising the reaction product of phosphorus pentoxide with anhydrous liquid ammonia. No. 2,163,085. Martin Eli Cupery, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Moth-repellent preparation for application to fabrics, consisting of the impregnation of the fabric with a fluosilicate of a polymeric amino-nitrogen-containing compound. No. 2,163,104. Paul L. Salzberg, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Soap wrapper, having on the outer side a coating of heat-insulating material, and on the other a vinyl resin coating resistant to moisture, acid, and alkali. No. 2,163,228. Joseph H. Jorling, Cincinnati, Ohio, to The McDonald Printing Co., Norwood, Ohio.

Expansion-joint material, containing a mixture of polymerized cottonseed oil and bituminous material. No. 2,163,553. Albert C. Fischer, Chicago, Ill., to The Philip Carey Manufacturing Co., of Ohio.

Impregnated mineral wool felt, the fibers of which are coated and felted together with a mixture of plasticized resin (of melting-point of at least 100 deg. F.) and a water-insoluble alkali metal soap. No. 2,163,567. Jesse Howell Gregory, Wheaton, Ill., to American Rock Wool Corp., Wabash, Ind.

Liquid adhesive composition, comprising odorless polymerized chloroprene containing a total of 5% of diethylamine and monoethanolamine, all dispersed in a suitable solvent therefor. No. 2,163,611. Alexander D. Macdonald, Malden, Mass., to B. B. Chemical Co., Boston, Mass.

Denatured alcohol formula, the essential denaturant being dibenzylamine, which is present in from 0.5 to 5.0 parts per 100 parts of 95% alcohol. No. 2,163,834. Lois J. Figg, Jr., Kingsport, Tenn., to Eastman Kodak Co., Rochester, N. Y., a corp. of New Jersey.

Dehydrating agent, comprising phosphorus pentoxide and an inert, comminuted material adherent to the pentoxide such that none of the latter remains loose. No. 2,163,901. Walter O. Walker and William R. Rinelli to Ansul Chemical Co., all of Marinette, Wis.

Pencil-shaped eraser containing a tenacious composition of lithopone, powdered English whiting, plaster of Paris, pure gelatine, pumice stone, and water sufficient to form a crumbly mass. No. 2,164,035. Warren E. Jones, Chicago, Ill.

Flotation reagent for oxide ore, comprising 45.1% oleic acid (by weight), 40.6% kerosene, 5.5% soda ash, and 8.8% sodium silicate. No. 2,164,063. Royal S. Handy, Kellogg, Idaho.

Cleaning and bleaching composition, a water-soluble salt of hypophosphoric acid, a per compound bleaching agent, and an alkaline earth silicate. No. 2,164,146. Werner Reuss, Dusseldorf-Benrath, and Friedrich Hoermann von und zu Guttenberg, Dusseldorf, Germany, to Henkel & Cie G.m.b.H., Dusseldorf-Holthausen, Germany.

Fish glue adhesive, comprising a spreadable fish meal and metallic salts contained therein, being water-insoluble when dry. No. 2,164,269. William Dawes Fawthrop, to I. F. Laucks, Inc., both of Seattle, Wash.

Coal Tar Chemicals

Preparation of imidazolines of complex structure. No. 2,161,938. Adolf Sonn, Konigsberg, Germany, to Society of Chemical Industry in Basle, Basel, Switzerland.

Preparation of 1,9-pyrazolanthrone-6-aldehyde. No. 2,162,205. Earl E. Beard, South Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation of a dipyrazolanthrone-6,6'-dialdehyde. No. 2,162,206. Earl E. Beard, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture detergent acids from sulfonated acyclic phenols of M. W. greater than 100. No. 2,162,269. Louis A. Mikeska, Westfield, N. J., to Standard Oil Development Co., a corp. of Delaware.

Manufacture substituted perinaphthindandiones containing at least one salt-forming group as substituent in the naphthalene nucleus. No. 2,163,110. Fritz Straub and Peter Pieth, to the firm of Society of Chemical Industry in Basle, all of Basel, Switzerland.

Manufacture alkyl cyclohexanones, by dehydrogenating the corresponding phenols. No. 2,163,284. Wilbur A. Lazier, Wyckwood, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production aromatic amines. No. 2,163,617. Harold G. Mow, Buffalo, N. Y., to National Aniline and Chemical Co., Inc., New York City.

Preparation aza compounds of high molecular weight, from a pyrimidine nucleus. No. 2,163,950. Karl Koeberle, Ludwigshafen-on-the-Rhine, Germany, to General Aniline Works, Inc., New York City.

Hydrogenation of mono- nitro alkoxy- benzenes. No. 2,164,154. Clyde O. Henke, Wilmington, Del., and Roland G. Benner, Carneys Point, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Coatings

Metal coating composition for metal containers of alkali metal hydroxide, comprising an inner surface lining of a cellulose ether having admixed therewith a small quantity of an alkyl naphthalene. No. 2,162,027. Irving E. Muskat, Akron, Ohio, to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Coating composition resistant to the action of corrosive chemicals, comprising 1.5 parts (by weight) diamyl naphthalene, 6 parts ethyl cellulose, 3 parts titanium dioxide, 22.5 parts ethanol, 42.7 parts toluene, 22.5 parts xylene, and 2.3 parts methyl cellosolve acetate. No. 2,162,028. Irving E. Muskat, Akron, Ohio, to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Method of forming a protective fluoride layer on magnesium, and magnesium base alloys, comprising electrolytic deposition of fluoride from a fused electrolyte containing higher complex metallic fluorides. No. 2,162,129. Julius Soll, Leverkusen-I. G. Werk, Germany, to Magnesium Development Corp. of Delaware.

Varnish for preserving oil paintings and the like, consisting of about 60% ethyl cellulose, about 20% drying oil, about 7.5% copal gum, and about 7.5% plasticizer. No. 2,162,225. Jean R. L. Martin, New York City.

U. S. Chemical Patents

Off. Gaz.—Vol. 502, Nos. 3, 4, 5—Vol. 503—Vol. 504, No. 1—p. 121

A water-soluble polyvinyl alcohol coating for metals, inhibiting corrosive and tarnishing action. No. 2,162,618. Emmette F. Izard, Kenmore, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method giving normally hygroscopic salts a discontinuous, water-repellent coating, comprising applying a surface coating of oil to the moist particles, and then subjecting them to 500-700 deg. F. for from 3 to 20 minutes. No. 2,162,690. Leslie D. Anderson, Carlsbad, N. Mex., to Potash Co. of America, Denver, Colo.

Method coating glass with molten metal, comprising dipping the glass, preheated to a temperature below its softening point, into molten metal bath heated above the glass's annealing point but below 1500 deg. C., and allowing the metal to form a congealed layer on the glass surface. No. 2,162,980. Rowland D. Smith, to Corning Glass Works, both of Corning, N. Y.

Method coating metallic objects with a rust-resistant surface layer, comprising applying simultaneously a solution of phosphoric acid and animal glue, and one of a chrome-oxygen compound. No. 2,163,984. Valentin Anton Petkovic, Berlin, Germany.

Dyes, Stains, etc.

Preparation dyestuffs by condensation of aminoanthracene derivatives with a halogenated benzobenzanthrone, the anthrimide compound so formed being fused with caustic alkali. No. 2,161,967. Ralph N. Lulek, Silverside Heights, Del., and Clarence F. Belcher, Bridgeton, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation vat dyestuffs of the anthrimide-carbazole series. No. 2,162,196. Joseph Deinet, Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Dyestuffs prepared from dipyrazolanthronyls. No. 2,162,201. Melvin A. Perkins, Milwaukee, and Clifford E. Carr, South Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation a vat dyestuff from a diacid-trianthramide. No. 2,162,203. Henry J. Weiland, Wilmington, Del., and Ralph N. Lulek, South Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture an azo dyestuff from the coupling of a primary aryl amine having para to the amino group an alkyl substituent of 8-20 carbon atoms, with an amino-naphthol sulfonic acid. No. 2,162,507. Arthur Howard Knight, Blackley, England, to Imperial Chemical Industries, Ltd., a corp. of Great Britain.

Color-producing azo compound, and method of preparing same. No. 2,162,960. Eugene A. Markush, Jersey City, and Julius Miller, Newark, N. J., to Pharma Chemical Corp., New York City.

Formulation a dyestuff suitable for dyeing human hair, comprising a composition containing an organic dye and a chemical having the nucleus: -N-(CO)-N-. No. 2,163,043. Wolf Kritchevsky, to Rit Products Corp., both of Chicago, Ill.

Water-insoluble azo dyestuffs yielding, when developed on the fiber, garnet to black colors. No. 2,163,073. Erwin Thoma, Frankfort-on-the-Main-Hochst, and Wilhelm Seidenfaden, Offenbach-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Water-insoluble dyestuffs, having an azo linkage, which yield garnet to black shades on the fiber when developed thereupon. No. 2,163,074. Erwin Thoma, Frankfort-on-the-Main-Hochst, and Wilhelm Seidenfaden, Offenbach-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Preparation halogenated indigoid dyestuffs yielding on cotton very fast blue prints, claimed to be particularly fast to washing, chlorine, and light. No. 2,163,094. Eduard Kambli, to Society of Chemical Industry in Basle, both of Basel, Switzerland.

Preparation polyazo dyestuffs yielding in general brown shades. No. 2,163,251. Fritz Suckfull, Leverkusen, Wiesdorf, Germany, to General Aniline Works, Inc., New York City.

Dye and stabilizer therefor, intended for coloring lubricating oil. No. 2,163,300. Jones I. Wasson and Garland H. B. Davis, Elizabeth, N. J., to Standard Oil Development Co., of Delaware.

Manufacture water-soluble monoazo dyestuffs yielding on leather brown tints of good evenness. No. 2,164,008. Erich Fischer, Bad Soden in Taunus, and Richard Huss and Walter Gmelin, Frankfort-on-the-Main-Hochst, Germany, to General Aniline Works, Inc., New York City.

Explosives

Explosive composition comprising readily-oxidizable metal and finely shredded asbestos; brisance controlling material contained therein comprises ground baked cork. No. 2,162,910. Laud S. Byers, Glendale, Calif., to Molex Explosives, Ltd., Manila, P. I.

Priming compositions, containing diazo-triazole carboxylic acid. No. 2,163,498. Erich Scholz, Grotzingen, Germany, to Deutsche Waffen-und Munitionsfabriken Aktiengesellschaft, Berlin-Charlottenburg, Germany.

Fine Chemicals

Method for preparation of vitamin-rich extracts from oils, fats, and like vitaminiferous materials. No. 2,161,882. James A. Patch, Stoneham, Mass.

Preparation of hydantoins containing the sterol nucleus. No. 2,161,928. Karl Miescher, Riehen, and Albert Wettstein, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Manufacture of 2,4,6-triamino-1,3,5-triazine from dicyandiamide. No. 2,161,940. Gustave Widmer, Basel, Willi Fisch, Riehen, and Josef Jakl, Basel, Switzerland, to the Society of Chemical Industry in Basle, Basel, Switzerland.

Antiseptic mercurial, comprising the azotization product of an aminoaryl sulfonic compound with a hydroxy-aryl mercuriated compound, said product being water-soluble. No. 2,162,014. Russell Hopkinson and Alexander V. Tolstoouhov, to Ostro Research Laboratories, Inc., both of New York City.

Preparation of a sulfonamido-substituted aromatic carboxylic acid mercury compound. No. 2,162,211. Carl N. Andersen, Wellesley Hills, Mass., to Lever Brothers Co., a corp. of Maine.

Preparation of thionol from phenothiazine. No. 2,162,686. Floyd De Eds, San Francisco, Calif., Clyde W. Eddy, Pullman, Wash., and John O. Thomas, San Francisco, Calif., to Henry A. Wallace, Sec. of Agriculture of the U. S. of America.

Production of d-ribose from calcium d-altronate. No. 2,162,721. Claude S. Hudson, Washington, D. C., and Nelson K. Richtmyer, Greene County, N. Y., to the Government of the United States, as represented by the Secretary of the Treasury.

Process for stabilization of crystalline proteolytic enzyme from ficus latex. No. 2,162,737. Randolph T. Major, Plainfield, and Alphonse Walti, Westfield, N. J., to Merck & Co., Inc., Rahway, N. J.

Non-oxidizing and non-deteriorating developer solution: 8 oz. sodium sulfite, 2 oz. boric acid, 3 oz. hydroquinone, 12 oz. sodium carbonate, 200 grains oxalic acid, 360 grains potassium bromide, 50 grains citric acid, and 300 grains potassium metabisulfite; all dissolved in one gallon of water. No. 2,162,765. Louis Tarnoff, Chicago, Ill.

Preparation a cyclic substituted dichlorinated hydrocarbon. No. 2,162,970. Anderson W. Ralston and Carl W. Christensen, to Armour & Co., both of Chicago, Ill.

Preparation of aliphatic polycarboxylic acids from the polymerization and hydrolysis of aliphatic nitriles having at least 10 carbon atoms. No. 2,162,971. Anderson W. Ralston, to Armour & Co., both of Chicago, Ill.

Preparation of N-methyl beta-hydroxy-ethylamines. No. 2,163,099. Robert William Maxwell, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Preparation of a lactone of a saturated aliphatic hydroxyether acid of at least 8 carbon atoms, by heating in vacuo a linear polyester of said acid. No. 2,163,109. Edgar W. Spanagel, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Preparation of the tauride of one of the group comprising anthraquinone carboxylic and sulfonic acids, and such acids having a halo-substituted nucleus. No. 2,163,146. Karl Kumetat, Wolfen, Bitterfeld, and Sebastian Gassner, Leverkusen, near Cologne, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Method of separating chlorophyllian pigment from alginous material. No. 2,163,147. Victor Charles Emile Le Gloahec, Rockland, Maine, to Algin Corp. of America, New York City.

Photographic developer, having a para-phenylenediamine derivative of a polymethylene ether-glycol as principal ingredient. No. 2,163,166. Gustav Wilmanns, Wolfen, Bitterfeld, and Wilhem Schneider and Bruno Wendt, Dessau, Anhalt, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Manufacture lactone from omega-hydroxy-pentadecanoic acid. No. 2,163,268. Wallace Hume Carothers, Arden, and Julian Werner Hill, Wilmington, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation an aliphatic mercurated alkyl amide. No. 2,163,296. Donalee L. Tabern, Lake Bluff, Ill., to Abbott Laboratories, North Chicago, Ill.

Production of amino carboxylic acids, by ammonolysis, in the presence of ammonium halide, of the corresponding halo-acids. No. 2,163,594. William H. Engels, Rahway, and Gustav A. Stein, Elizabeth, N. J., to Merck & Co., Inc., Rahway, N. J.

Preparation of polyhydric phenol compounds. No. 2,163,639. Harold Von Bramer and Albert C. Ruggles, Kingsport, Tenn., to Eastman Kodak Co., Jersey City, N. J.

Preparation from ficus latex of a crystalline proteolytic enzyme. No. 2,163,643. Alphonse Walti, Westfield, N. J., to Merck & Co., Inc., Rahway, N. J.

Extraction and purification of a pure provitamin D material from the fatty material of sea mussels. No. 2,163,659. Albert Gerhardus Boer, Eindhoven, Johannes van Niekerk, Leiden, and Engbert Harmen Reerink and Aart van Wijk, Eindhoven, Netherlands, to N. V. Philips' Gloeilampenfabrieken, Eindhoven, Netherlands.

Manufacture of anion mercuri-1,3-dihydroxy-4-alkyl-6-halo-benzene. No. 2,163,745. Walter G. Christiansen, Glen Ridge, N. J., to E. R. Squibb & Sons, N. Y. City, a corp. of New York.

Organic developer solution containing a divalent, tautomeric radical of the type: $-CH(NR_2)-CO-$, where "R" may be hydrogen, alkyl, aryl, or acyl. No. 2,163,781. John Eggert, Leipzig and Bruno Wendt, Dessau, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Organic developer compound derived from a heterocyclic diamine of the benzene series. No. 2,163,820. Gustav Wilmanns, Wolfen, Bitterfeld, and Wilhelm Schneider and Alfred Frohlich, Dessau Anhalt, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Preparation organosodium compounds. No. 2,163,846. Avery A. Morton, Watertown, Mass., and Ingenuin Hechenblaikner, Charlotte, N. C.

Manufacture phenanthrolin ether derivatives. No. 2,163,946. Hans Henecka, Wuppertal-Elberfeld, Germany, to Winthrop Chemical Co., Inc., New York City.

Preparation of symmetrical aromatic urea derivatives. No. 2,164,229. Albert Coulthard, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., of Great Britain.

Manufacture of hexanepentols from the corresponding hexitols. No. 2,164,268. Lloyd W. Covert, to Rohm & Haas, both of Philadelphia, Pa.

Preparation of secondary amino-alcohols. No. 2,164,271. Henry B. Hass, West Lafayette, and Byron M. Vanderbilt, Terre Haute, Ind., to Purdue Research Foundation, Lafayette, Ind.

Fine-grain photographic developer, containing para-methylamino-phenol or -cresol. No. 2,164,280. Edmund W. Lowe, to The Edwal Laboratories, Inc., both of Chicago, Ill.

Glass

Alkali-vapor resistant glass formula: silica (15-25%), alumina (25-35%), boric oxide (20-35%), and alkaline earth oxide (20-25%). No. 2,161,824. Hermann Krefft, Berlin-Friedrichshagen, Walter Hanlein, Berlin-Spandau, and Martin Wagner, Weiss wasser O/L, Germany, to General Electric Co., of New York.

Manufacture laminated safety glass, and apparatus therefor. No. 2,163,648. George B. Watkins and David H. Goodwillie, Toledo, Ohio, to Libbey-Owens-Ford Glass Co., Toledo, Ohio.

Industrial Chemicals

Manufacture oxidation products from high M. W. paraffins, by treating the tarry mixtures with an aromatic nitro solvent. No. 2,158,650. Cristoph Beck and Franz Kremp, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Catalyst mixture for the polymerization of a vinylidene halide, comprising tetraethyl lead, a peroxide, one of the group consisting of organic poly-halo hydroxy compounds, chloracetyl chloride, and poly-halo aryl ethers, and an electrically deposited, spongy copper material that has been treated with one of the group consisting of hydrogen chloride, hydrogen sulfide, and oxygen. No. 2,160,939. Robert C. Reinhardt, to The Dow Chemical Co., both of Midland, Mich.

Method separating mono- and di-vinylacetylene from their admixtures with each other, comprising liquid-phase stripping of the mixture with acetylene gas. No. 2,161,797. Albert S. Carter, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

U. S. Chemical Patents

Off. Gaz.—Vol. 502, Nos. 3, 4, 5—Vol. 503—Vol. 504, No. 1—p. 122

Separation of divinylacetylene from its admixture with a solution also containing an oily polymer of divinylacetylene, method essentially comprising stripping of the liquid-phase mixture with an inert gas. No. 2,161,798. Albert S. Carter, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Process for recovery of potassium compounds from underground beds, essentially comprising circulation through the latter of superheated saline solution acting as a solvent for the potassium-bearing minerals. No. 2,161,800. Roy Cross, Kansas City, Mo.

Manufacture of zinc-free double sulfate of copper and sodium. No. 2,161,825. Ernst Kuss, Kurt Horalek, and Oskar Emert, Duisburg, Germany, one-half to Duisburger Kupferhutte, Duisburg, Germany, and one-half to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method alkylating phenols. No. 2,161,826. Lucas P. Kyrides, Webster Groves, Mo., to Monsanto Chemical Co., St. Louis, Mo.

Manufacture a sulfuric acid ester of a branched chain octanol. No. 2,161,857. Joseph G. Davidson, Scarsdale, N. Y., to Carbide and Carbon Chemicals Corp., of New York.

Method fractionating proteinaceous liquors containing pseudoglobins and relatively inactive proteins. No. 2,161,861. Tillman D. Gerlough, Highland Park, N. J., to E. R. Squibb & Sons, New York City.

Surface active compound of the group consisting of forms of beta-sulfated, a,a'-dialkylglycerine ethers having not more than 25 carbon atoms. No. 2,161,937. Norman D. Scott, Sanborn, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method coagulating aqueous dispersions of 2-chloro-1,3-butadiene with an agent consisting of an aliphatic quaternary ammonium salt derivative. No. 2,161,949. William S. Calcott, Woodstown, N. J., and Mortimer A. Youker, Gordon Heights, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method controlling gas-phase exothermic reactions involving use of a solid catalyst. No. 2,161,974. Edward B. Peck, Elizabeth, N. J., to Standard Oil Development Co., of Delaware.

Production of olefins from paraffins having 3-6 carbon atoms, essentially involving dehydrogenation over sulfur-containing catalysts, such that the reaction products are hydrogen sulfide and an olefine of the same number of carbon atoms as the entering paraffin. No. 2,161,991. Hans Baehr, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Catalyst for dehydrogenating paraffin hydrocarbons, essentially an oxide of divalent chromium. No. 2,162,011. Henri Martin Guinot, Melle, Deux-Sevres, France, to Les Usines de Melle, of France.

Processing of coal for briquetting purposes. No. 2,162,064. Maurice D. Curran, Glendale, Mo., to Tar & Petroleum Process Co., Chicago, Ill.

Preparation of pulverized coal-oil-water paste emulsions, thereby reducing materially the ash content of the coal. No. 2,162,200. Siegfried Kiesskalt, Hans Tampke, Karl Winnacker, and Ernst Weingaertner, to I. G. Farbenindustrie Aktiengesellschaft, both of Frankfort-on-the-Main, Germany.

Method reducing oxygen content of coal. No. 2,162,221. Leo Kasehagenand, Homer H. Lowry, Pittsburgh, Pa., to Carnegie Institute of Technology, Pittsburgh, Pa.

Tin compound, as stabilizer for soap colorants. No. 2,162,255. Robert F. Heald, Nutley, N. J., to Colgate-Palmolive-Peet Co., Jersey City, N. J.

Manufacture activated charcoal from wood. No. 2,162,366. Maurice E. Barker and Robert S. Brown.

Method for polymerizing acetylene. No. 2,162,373. Albert S. Carter, Wilmington, and Howard W. Starkweather, New Castle County, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method for separation of foam-forming substances from sugar liquors. No. 2,162,379. Richard A. Dole, San Francisco, and James W. McBain, Stamford University, Calif., to Chemical Process Co., San Francisco, Calif.

Manufacture large surface electrode bodies. No. 2,162,385. Erich Langguth, Hagen-Emst, Germany.

Manufacture insulating bodies from mineral wool fibers. No. 2,162,386. Bruno Neuhof, Berlin, Germany.

Apparatus for gas analysis. No. 2,162,395. Owen G. Bennett, to Catalyst Research Corp., both of Pittsburgh, Pa.

Electrolyte for condensers, comprising a mixture of polyhydric alcohol, alkaline oxide or hydroxide, and anhydride of a weak acid. No. 2,162,397. Donald E. Gray, Teaneck, N. J.

Method for alkyl ester interchange with a monobasic aliphatic acid. No. 2,162,451. Harald W. de Ropp, Charleston, W. Va., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Synthesis of fatty acids higher than acetic. No. 2,162,459. Donald J. Loder, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture ethyl chloride. No. 2,162,532. Walter Flemming, Ludwigshafen-on-the-Rhine, Karl Dachlauer, Hofheim-in-Taunus, and Erwin Schnitzler, Frankfort-on-the-Main-Hochst, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Color stabilizer for fatty acids, comprising oxalic acid present in very small amount. No. 2,162,542. Frank G. Amthor, East Rutherford, and George Zinzalian, Boonton, N. J., to Wecoline Products, Inc., Boonton, N. J.

Manufacture liquid sulfur dioxide. No. 2,162,637. Harold M. Pitt, Jr., Los Angeles, and Alfred M. Esberg, Mountain View, Calif.

Process degreasing metal parts. No. 2,162,656. Charles J. S. Warrington, Westmount, Quebec, Canada, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture commercially pure alkali metal sulfate. No. 2,162,657. Andreas Wehrstein, Vienna, Austria, to Persil Gesellschaft Henkel & Voit m.b.H., Vienna, Austria.

Manufacture of acetylene glycols. No. 2,162,676. Alexander Douglas Macallum, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture asphaltic sand rock composition. No. 2,162,720. Garde James Hines, Kansas City, Mo.

Method extracting nicotine from tobacco. No. 2,162,738. Clarence E. McCoy, Florence, Ala.

Production active carbon masses. No. 2,162,763. Kenneth Barton Stuart, Denver, Colo., to The Colorado Fuel and Iron Corp. of Colorado.

Method regenerating contact catalyst bodies in situ. No. 2,162,893. Paul E. Kuhl, Madison, N. J., to Standard Oil Development Co., a corp. of Delaware.

Production of alcohols and ethers by catalytic hydration of olefines. No. 2,162,913. James F. Eversole and Charles W. Rehm, Charleston, W. Va., to Carbide and Carbon Chemicals Corp. of New York.

Method manufacturing fuel briquettes from fuel containing occluded resinous material. No. 2,162,989. Ellsworth B. A. Zwoyer, Perth Amboy, and Albert L. Stillman, Plainfield, N. J., to The General Fuel Briquette Corp., Jersey City, N. J.

Method and apparatus for making charcoal. No. 2,162,991. Rea Van Anderson, Los Angeles, Calif.

Manufacture hydrogen peroxide. No. 2,162,996. Lyman H. Dawsey, Wooster, Ohio.

Method for continuous production of volatile fatty acid anhydrides. No. 2,163,013. Hermann Schulz, Mainz-Mombach, Germany.

Color stabilizer for heavy metal salts of higher fatty acids, comprising a diphenyl thiourea compound. No. 2,163,020. Mihai Bogdan, Ploesti, Rumania, to Shell Development Co., San Francisco, Calif.

Manufacture sodamide, by reaction of sodium with liquid ammonia in the presence of iron compounds. No. 2,163,100. Clemmy O. Miller and Richard G. Roberts, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture of acid derivatives of aliphatic esters of the wax type. No. 2,163,133. Walther Schrauth, Berlin-Dahlem, Germany, to "Unichem" Chemikalien Handels A.-G., Zurich, Switzerland.

Process recovering hydrogen sulfide from coke oven gases. No. 2,163,169. Herbert A. Gollmar, Union Township, Union County, N. J., to Koppers Co., a corp. of Del.

Manufacture organic sulfides. No. 2,163,176. Ernst Keyssner, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture of vinyl compounds from corresponding vinyl sulfur derivatives. No. 2,163,180. Hanns Ufer, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Production of halogen-alkyl amines and their salts. No. 2,163,181. Heinrich Ulrich and Ernst Ploetz, Ludwigshafen-on-the-Rhine, and Max Bogemann, Cologne, Muhlheim, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Separation of malt enzymes from mash with aluminum silicate adsorbents. No. 2,163,200. Eberhard Heimann, Berlin-Schoneberg, Germany.

Manufacture porous building material. No. 2,163,207. Simon Missotten, Brussels, Belgium.

Thermal polymerization of acetylene to obtain both aryl hydrocarbons and monovinylacetylene. No. 2,163,223. Mario Zavka, Terni, Italy, to Ammonia Casal e Societa Anonima, Lugano-Massagno, Switzerland.

Method desulfurizing alkyl phenols contaminated with mercaptans. No. 2,163,227. Walter J. Hund and Samuel Benson Thomas, Oakland, and Daniel B. Luten, Jr., Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Manufacture of boron fluoride, by heating of boric oxide and calcium fluoride. No. 2,163,232. Emile L. Baldeschwieler, Cranford, N. J., to Standard Oil Development Co., of Delaware.

Manufacture polymerizates of crotylidene cyanacetic acid compounds. No. 2,163,238. Karl Hamann, Krefeld-Uerdingen, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture polymers of butadiene compounds, by action of hydrogen sulfide. No. 2,163,250. Howard Warner Starkweather, New Castle County, and Arnold Miller Collins, Wilmington, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method of drying milk whey. No. 2,163,331. John R. Spellacy, Burlingame, Calif., to Hercules Powder Co., Wilmington, Del.

Continuous contact process for sulfuric acid, the catalyst being a solid activated body. No. 2,163,371. James B. Castner, Woodbury, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Aqueous bitumen dispersion for road-making, the emulsifier being an alkali metal salt of a rosin soap. No. 2,163,445. Leonard Gowen Gabriel and John Frederic Thomas Blott, London, England, to The Flintkote Co., New York City.

Process for preparing granulated cement clinker. No. 2,163,513. Alfred E. Douglass, Catasaugua, Pa., to Fuller Company, Catasaugua, Pa.

Manufacture a hydrated, decolorizing magnesium silicate mass. Nos. 2,163,525-6-7. Lyle Caldwell, Los Angeles, Calif.

Manufacture thiocarbonates of chlorinated paraffins. No. 2,163,535. Henry G. Berger, Woodbury, Robert C. Moran, Wenonah, and Francis M. Seger, Pitman, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Recovery of elemental sulfur from gases containing sulfur dioxide, by reduction in continuous cycle of sulfites. No. 2,163,554. Gant Gaither, Hopkinsville, Ky.

Preparation of metallic oxide catalysts for regulating rate of chemical reactions. No. 2,163,602. Leslie G. Jenness, Brooklyn, N. Y., to Intermetal Corp., Newark, N. J.

Manufacture of semi-solid edible product, by hydrogenating soy bean oil in presence of nickel-chrome oxide catalyst. No. 2,163,603. Leslie G. Jenness, Englewood, N. J., to Intermetal Corp., Newark, N. J.

Method reducing nitro-oxy aromatic compounds to amines, by metallic reduction in acid solution, the mixture being agitated in a rotary mill such that the metal particles are ground upon each other. No. 2,163,609. Alexander D. Macdonald, Malden, Mass., to B. B. Chemical Co., Boston, Mass.

Separation of pectin, by precipitation from its solutions with a copper salt. No. 2,163,620. Philip Bliss Myers, Scarsdale, N. Y., to Sardik, Inc., Jersey City, N. J.

Separation of pectin from its solutions, by adding a nickel salt and precipitating at pH 3.5-4.5. No. 2,163,621. Philip Bliss Myers, Scarsdale, N. Y., to Sardik, Inc., Jersey City, N. J.

Manufacture of normal, secondary pentadecyl sulfates. No. 2,163,651. James Herbert Werntz, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Preparation acetylenic alcohols by direct reduction of ketones with acetylene, in alkaline solution. No. 2,163,720. Thomas H. Vaugn, Niagara Falls, N. Y., to Union Carbide and Carbon Research Laboratories, Inc., of New York.

Preparation processed cheese, by homogenizing at an appropriate temperature with a soluble complex sodium alkaline-earth-phosphate. No. 2,163,778. Fritz Draisbach, Ludwigshafen-on-the-Rhine.

Manufacture of crystalline starch by seeding starch-sugar concentrated aqueous solutions. No. 2,163,782. Walter R. Fetzer, Clayton, Mo., to Union Starch and Refining Co., Columbus, Ind.

Manufacture of chlorine-free chlorine dioxide. No. 2,163,793. John Ogden Logan, Niagara Falls, N. Y., to The Mathieson Alkali Works, Inc., New York City.

Manufacture basic reaction products from lower fatty acids, and their amides, combined with at least 3 mole proportions of ethylene imine.

U. S. Chemical Patents Off. Gaz.—Vol. 502, Nos. 3, 4, 5—Vol. 503—Vol. 504, No. 1—p. 122

U. S. Chemical Patents

Off. Gaz.—Vol. 502, Nos. 3, 4, 5—Vol. 503—Vol. 504, No. 1—p. 123

No. 2,163,807. Henry Alfred Piggott and Francis Sydney Statham, Blackley, Manchester, England, to Imperial Chemical Industries, Ltd., of Great Britain.

Manufacture of bromine, by oxidation of hydrogen bromide with an oxygen-containing gas at 325-425 deg. C. over a metal catalyst. No. 2,163,877. George W. Hooker, to The Dow Chemical Co., both of Midland, Mich.

Method stabilizing oleo oil, by adding to the alkali-refined oil a quantity of hydrogenated, refined soy bean oil. No. 2,163,912. Harold S. Mitchell, to Industrial Patents Corp., both of Chicago, Ill.

Preparation alkyl xanthic disulfides. No. 2,163,956. August Moeller, Frankfort-on-the-Main-Griesheim, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture of secondary ethers of glycerol. No. 2,164,007. Theodore W. Evans, Berkeley, and Edwin F. Bullard, Oakland, Calif., to Shell Development Co., San Francisco, Calif.

Design for distillation fractionating plate. No. 2,164,080. John B. Shumaker, Des Moines, Iowa.

Manufacture solid alkali metal phosphates. No. 2,164,092. George W. Smith, to Hall Laboratories, Inc., both of Pittsburgh, Pa.

Process and apparatus for crystallizing solids, in a continuous cycle, from aqueous solutions. Nos. 2,164,111-12. Finn Jeremiassen, to Aktieselskapet Krystal, both of Oslo, Norway.

Continuous process manufacturing sugar. No. 2,164,186. Robert J. Brown and Alpheus R. Nees, Denver, and Claude T. Carney, Greeley, Colo., to The Great Western Sugar Co., Denver, Colo.

Esterification of allyl-type alcohols. No. 2,164,188. Herbert P. A. Groll, Oakland, and George Hearne, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Continuous process for the extraction and refining of fatty matters by a countercurrent system. No. 2,164,189. Walter J. Hund and Donald H. Rowe, Oakland, Calif., to Shell Development Co., San Francisco, Calif.

Apparatus for countercurrent extraction of a liquid with a fluid of lower sp. gr. than said liquid. No. 2,164,193. Donald S. McKittrick, Oakland, Calif., to Shell Development Co., San Francisco, Calif.

Process removing acidic impurities from a fluid. No. 2,164,194. Russell W. Millar, Berkeley, and Russel L. Maycock, San Francisco, Calif., to Shell Deveopment Co., San Francisco, Calif.

Continuous process manufacturing chlorhydrins, by action of aqueous chlorine on olefins. No. 2,164,240. Henri Martin Guinot, Niort, Deux-Sevres, France, to Usines de Melle, Melle, France.

Process fermenting disaccharides by the organism *B. tetryl.* No. 2,164,255. William Ludwell Owen, Baton Rouge, La.

Method and apparatus for the distillation of glycerine. Nos. 2,164,274-5-6. Martin Hill Ittner, to Colgate-Palmolive-Peet Co., both of Jersey City, N. J.

Hydrogenated, stable liquid oil product, prepared from a glyceride oil having more than 2 double bonds. No. 2,164,291. Leslie G. Jenness, Englewood, N. J., to Intermetal Corp., Newark, N. J.

Manufacture hydrogen from gaseous hydrocarbons and steam, in the presence of a metallic oxide catalyst body. No. 2,164,292. Leslie G. Jenness, Englewood, N. J., to Intermetal Corp., Newark, N. J.

Leather

Method of correcting rot in tanned leather, consisting of impregnating the leather with an organic nitrogen base in such amount as to raise the leather pH to between 3.0 and 4.0. No. 2,162,015. Alfred W. Hoppenstedt, to J. A. Webb Belting Co., Inc., both of Buffalo, N. Y.

Curing of animal gut, comprising the immersion of raw gut in aqueous bath including a water-soluble synthetic tanning agent, for a period of several hours at 35-50 deg. F. No. 2,164,101. Nicholas M. Adams, Chicago, Ill., to Wilson & Co., of Delaware.

Process for deacidification of water, comprising passage of the water over extensive surfaces of a keratin substance in an insoluble condition, and regenerating said keratin substance from time to time by washing with dilute alkali. No. 2,164,156. Otto Liebknecht, Neubabelsberg, near Berlin, Germany, to The Permutit Co., New York City.

Metals and Alloys

Core binding formula for foundry use, comprising mineral pitch, bentonite, fibrous vegetable fiber, and a vegetable adhesive material. No. 2,162,059. Walter C. Chedic, Oakland, Calif.

Dental casting alloy adaptable to repeated melting and casting, consisting of 5-30% chromium, 10-50% cobalt, up to 1% each of manganese and silicon, 1-10% boron, and the balance of nickel. No. 2,162,252. Cornell Joel Grossman, Millburn, N. J.

Nickel dental casting alloy, containing cobalt (10-50%), chromium (5-30%), manganese (1-2%), and boron (1-10%). No. 2,162,253. Cornell Joel Grossman, Millburn, N. J.

Manufacture metallic catalysts. No. 2,162,276. John Morris Weiss, New York City, to Calorider Corp., Old Greenwich, Conn.

Smelting of beryllium ores with ammonium fluoride, to recover the beryllium values. No. 2,162,323. Albert Wille, Frankfort-on-the-Main, and Gustav Jaeger, Neu-Isenburg, Germany, to Deutsche Gold und Silver Scheideanstalt vormals Roessler, Frankfort-on-the-Main, Germany.

Conducting device, comprising a copper body coated with one of the following: lead oxide, thallium oxide, or thallium. No. 2,162,362. George O. Smith, Bloomfield, N. J., to Bell Telephone Laboratories, Inc., New York City.

Refractory metal composition, comprising carbides of molybdenum and/or tungsten, silver, and a very small amount of copper. No. 2,162,380. Arnold S. Doty and Earl F. Swazy, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Smelting of alloy pig irons. No. 2,162,402. Kurt Hornemann, Essen, Germany.

Method of making high-manganese pig iron. No. 2,162,437. Clarence D. King, Brooklyn, N. Y.

Sealing-in wire alloy metal, consisting of an alloy of iron containing a major amount of columbium and/or tantalum. No. 2,162,489. Kurt Matthies, Berlin-Siemensstadt, and Hartmut Ganswindt, Berlin-Friedenau, Germany, to Siemens & Halske, Aktiengesellschaft, Siemensstadt, near Berlin, Germany.

Method for flotation concentration of phosphate ores. Nos. 2,162,494-5. William Trotter, San Francisco, and Eltoft Wray Wilkinson, Berkeley, Calif., to Minerals Separation North American Corp., New York City.

Method for concentration of calcite from an argillaceous pulp of fine slimes. No. 2,162,525. Charles H. Breerwood, Narberth, Pa., to Separation Process Co., a corp. of Delaware.

Hard metal alloy, containing 30-50% of one of the iron group, 2-10% chromium, and the balance of titanium and tungsten carbides. No. 2,162,574. Walther Dawihl, Kohlhasenbruck, near Neubabelsberg, and Karl Schroter, Berlin, Germany, to General Electric Co., a corp. of New York.

Furnace heating element, comprising one of the iron group, together with one of the group: tungsten and molybdenum, in proportion of 2-45%. No. 2,162,596. Le Roy L. Wyman, Schenectady, N. Y., to General Electric Co., a corp. of New York.

Production liquid alkali metal, by condensation of its vapor in an inert cooling gas. No. 2,162,619. Burritt S. Lacy, Lewiston, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Alloy of copper having high fluidity at temperatures near its melting-point, containing 7.0-8.5% phosphorus, 1-3% silver. No. 2,162,627. Alpine R. MacGregor, Forest Hills, Pa.

Manufacture mosaics from powdered metals. No. 2,162,701. Gregory J. Comstock, Fairfield, Conn., to Handy & Harman, Bridgeport, Conn.

Method pickling aluminum, or its alloys, with a ferrous chloride-hydrochloric acid solution, prior to nickel plating the surface thereof. No. 2,162,789. Ernst Raub, Schwabish Gmund, Germany, to Edwin F. M. Speidel, Providence, R. I.

Apparatus for recovering finely-dispersed matter from aqueous solutions; said matter comprising metallic ores of the heavy metals, which latter are capable of reacting with mercury. No. 2,162,909. Emmett L. Brinker and Harvey J. Gray, Los Angeles, Calif., 30% to A. W. Knight, South Pasadena, Calif.

Process recovering gold from solutions, comprising the addition to the solution of an acid-produced polyhydric phenol resin in powdered form—said resin being water-insoluble—adsorbing the metal from solution; gold-bearing resin particles are then separated mechanically. No. 2,162,936. Harry Burrell, Bloomfield, N. J., to Ellis-Foster Co., of N. J.

Granular metallic reducing agent for metallurgical operations, consisting of finely-divided aluminum metal particles coated with cryolite. No. 2,162,938. George F. Comstock and Viatcheslav V. Efimoff, Niagara Falls, N. Y., to The Titanium Alloy Manufacturing Co., New York City.

Electrolytic process for preparing magnesium from molten magnesium chloride. No. 2,162,942. Charles de Rohden, Neuilly-sur-Seine, France.

Metallic resistance element for communicating systems, comprising essentially a composition compensating for moisture effects on resistivity of the circuit. No. 2,163,067. Newton C. Schellenger, Elkhart, Ind., to Chicago Telephone Supply Co., Elkhart, Ind.

Method producing alloys from a first group, of one of copper, nickel, and silver, and a second group, which includes the titanium sub-class of the 4th group, periodic system; essentially, powdered ingredients are melted together under hydrogen. No. 2,163,224. Peter P. Alexander, Marblehead, Mass., to Metal Hydrides, Inc., Marblehead, Mass.

Manufacture of boron carbide, by electrothermal fusion of carbon and boric acid. No. 2,163,293. Franz Schroll, Mueckenberg, and Adolf Vogt, Kraftborn, Germany, to Dr. Alexander Wacker, Gesellschaft fur Elektrochemische Industrie, G.m.b.H., Munich, Bavaria, Germany.

Electric make-and-brake contact, consisting of a tungsten alloy containing 0.1-2.5% osmium. No. 2,163,354. Alfred C. Schmidt, West Englewood, and Julius F. Back, Newark, N. J., to The H. A. Wilson Co., Newark, N. J.

Lead alloy, containing not over 0.5% cadmium and not over 0.01% phosphorus. No. 2,163,368. Jesse O. Betterton and Yurii E. Lebedeff, Metuchen, N. J., to American Smelting & Refining Co., New York City.

Oxidation-resistant alloy of lead, containing 0.001-0.01% phosphorus and 0.05-0.5% of an element from the group of antimony and arsenic. No. 2,163,369. Jesse O. Betterton and Yurii E. Lebedeff, Metuchen, N. J., to American Smelting & Refining Co., New York City.

Manufacture of barium black ash from barytes ore. No. 2,163,388. Adolph G. Wuethrich, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Dry plate selenium rectifier element. No. 2,163,393. Fritz Brunke, Berlin-Steglitz, and Werner Koch, Berlin-Glienicke-Nord, Germany, to General Electric Co., of New York.

Metal-to-ceramic seal, consisting of a metal member, about 30% magnesia, 61% silica, small amounts of alumina, lime and pyrolusite, and a thin layer of refractory metal powder on the ceramic surface. No. 2,163,407. Hans Pulfrich, Berlin-Friedenau, Germany, to General Electric Co., of New York.

Ceramic-to-refractory metal seal. Nos. 2,163,409-10. Hans Pulfrich, Berlin-Friedenau, and Richard Magner, Berlin, Germany, to General Electric Co., of New York.

Method for extracting potassium carbonate and aluminum hydroxide from leucite. No. 2,163,466. Remo Szyia Opatowski and Piero Adamoli, Milan, Italy.

Manufacture of abrasive alumina, by calcining and fusing bauxite with carbonaceous material. No. 2,163,532. Blakeslee Barnes, to Chemical Construction Corp., both of New York City.

Alloy for valve elements, resistant to corrosive action of volatile lead compounds, as in internal combustion engines, comprising an iron alloy containing 20-30% chromium, and 0.5-2.0% carbon. No. 2,163,561. Peter Payson, New York, Lewis S. Bergen, Great Neck, N. Y., and Walter L. Hodapp, East Orange, N. J., to Crucible Steel Co. of America, New York City.

Method for separating mixtures of mineral oil and higher fatty acid esters. No. 2,163,563. Walther Schrauth, Berlin-Dahlem, Germany, to Deutsche Hydrierwerke Aktiengesellschaft, Berlin-Charlottenburg, Germany.

Method concentrating oxide ore minerals, comprising a froth flotation method. No. 2,163,701. Robert C. Ried, West Conshohocken, Pa., to Separation Process Co., of Delaware.

Flotation reagent for mineral oxide ores, consisting of aqueous emulsion of a fatty acid oil and a mineral oil. No. 2,163,702. Robert C. Ried, West Conshohocken, Pa., to Separation Process Co., of Delaware.

Method for refining phosphato-vanadic acids, comprising a system whereby the acids are precipitated from crude phosphoric acid by the gradual addition of ammonia. No. 2,163,773. Frederic C. Bowman, to A. R. Maas Chemical Co., both of Los Angeles, Calif.

Manufacture of magnesium by thermal reduction of the oxide. No. 2,163,796. Oskar Meyer, Bitterfeld, Germany, to Magnesium Development Corp., of Delaware.

Manufacture magnesium oxychloride. No. 2,163,819. Fritz Wienert, Stassfurt, Germany, to Magnesium Development Corp., of Delaware.

Production of hydroxides of metals, from the group comprising one of the trivalent metals: aluminum, chromium, and iron, colloidally soluble in water. No. 2,163,922. Fritz Stoewener, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

U. S. Chemical Patents

Off. Gaz.—Vol. 502, Nos. 4, 5—Vol. 503—Vol. 504, No. 1—p. 124

Pickling method for iron and zinc, or alloys of either, comprising cleaning the metal with oxalic acid solution; surface so prepared is readily given a phosphate coating. No. 2,164,042. Gerald C. Romig, Elkins Park, Pa., to American Chemical Paint Co., Ambler, Pa.

Copper alloy, containing 0.1-3.0% magnesium and 0.1-3.0% chromium. No. 2,164,065. Franz R. Hensel and Earl I. Larsen, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Wet sorting apparatus for classification of minerals in a liquid stream. No. 2,164,124. Homer B. Slater, Pittsburgh, Pa., to Koppers-Rheolaveur Co., a corp. of Delaware.

Manufacture of powdered, carburized iron. No. 2,164,198. Frank O. Clements, Robert H. Terry, and Donald J. Henry, to General Motors Corp., all of Detroit, Mich.

Apparatus for charging of phosphorus into a molten mass. No. 2,164,228. John R. Burns, Powell, Ohio.

Manufacture a niobium alloy, consisting of melting a ferro-alloy of tantalum and niobium, adding sufficient of niobium-oxide slags such that the tantalum of the alloy shall displace substantially all of the slag-contained niobium. No. 2,164,279. Joseph Pierre Leemans, Hoboken, near Antwerp, Belgium, to Societe Generale Metallurgique de Hoboken, Hoboken, near Antwerp, Belgium.

Process separating fluorine compounds from acid calcium phosphate, comprising treating the phosphate solution with adsorptive silica formed by the acid leaching of silicate minerals. No. 2,164,627. Warren R. Seyfried, Tampa, Fla.

Two-stage process for producing low-carbon steel comprising, as the first stage, the production of steel containing little or no manganese and silicon and a comparatively large amount of dissolved oxygen in the form of ferrous oxide; as the second stage, the heat treatment of said steel in a granulated condition at a temperature below melting point in order to cause the dissolved oxygen to react with carbon and diffuse in the form of carbon monoxide. No. 2,164,727. Sigurd Westberg, Oslo, Norway.

Fluxing material for electric welding, containing as the essential ingredients an oxydic compound of titanium and an oxydic compound of zirconium, so proportioned that the ratio of titanium oxide to zirconium oxide is between 1.5 and 2.5. No. 2,164,775. Wilber B. Miller, Niagara Falls, N. Y., to Oxweld Acetylene Co., a corp. of West Va.

Preparation of noble metal catalysts, wherein a solution of the impure noble metal salt is treated with inert, separable carrier material, the mass separated and ignited at a temperature at which the impurities are oxidized and the metal obtained in reduced form; the oxidized impurities are removed by chemical means, leaving the purified, finely-divided metal with the inert carrier. No. 2,164,826. Herbert Langwell, Epsom, and John Francis Short, Ewell, England.

Continuous method of conditioning a wire formed of an alloy which softens and becomes more ductile when quickly quenched from a heated condition; process comprises the steps of advancing wire through an electrolyte liquid bath heating a section of said wire, as it advances, by passing through this section a heating electric current supplied through the bath; maintaining such bath at a desired temperature of quench; advancing such wire from the quench to the pickling bath; and passing through the liquid of the pickling bath a direct current, from a source, one terminal of which is connected to an anode inserted in the bath and the other terminal of which has electric connection through such quench bath with the wire under treatment. No. 2,164,850. William H. Wood, South Euclid, and Oscar C. Trautman, Parma, Ohio, to Ira Crouse, Conneaut, Ohio.

Gold alloy, consisting of about 33-84% gold, 11-67% copper, and 0.1-5.0% cobalt. No. 2,164,938. Arthur W. Peterson, North Attleboro, Mass., to Metals & Controls Corp., Attleboro, Mass.

Production of zinciferous agglomerates, comprising the steps: moistening the material with water, adding a binder, kneading the moistened mass until plasticity is developed, and forming agglomerates of the kneaded mass by extruding it through a die while subjecting it to a vacuum. No. 2,164,950. John F. W. Schulze, deceased, late of Cleveland, Ohio, by Henry L. Schulze, administrator, Yonkers, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Sintered welding rod, composed principally of ferrous material with not over 3.50% by weight of carbon, 3% nickel, 3% molybdenum, 1.50% manganese, 4.50% chromium, 0.10% sulfur, 0.30% phosphorus, and coated with a mineral spirits mixture containing water glass and metallic aluminum. No. 2,165,022. William Clifford Anderson, Fort Peck, Mont.

Heat-resisting ferrous alloy having scale-resisting properties and strength, containing about 0.40% carbon, 8.00% manganese, 4.50% silicon, 2.75% chromium. No. 2,165,035. Berton H. De Long and Omar V. Greene, near Reading, Pa., to The Carpenter Steel Co., Reading, Pa.

Lead alloy, containing 10-60% lead, 0.7801-3.1514% nickel, minute amounts of manganese, iron, phosphorus, aluminum, tin, magnesium, and silver, and the balance of silver. No. 2,165,085. Henry L. Whitman, Los Angeles, Calif.

Smelting furnace for preparation of rock wool. No. 2,165,242. Daniel C. Drill, Wabash, Ind., to American Rock Wool Corporation, Wabash, Ind.

Method of concentrating oxide ore minerals by froth flotation, which comprises introducing substantially pre-saponified, acid-refined talloel in an aqueous ore mineral pulp and agitating and aerating the pulp. No. 2,165,265. Mikael Vogel-Jorgensen, Frederiksberg near Copenhagen, Denmark, to Separation Process Company, Delaware.

Process for electroplating and bright-dipping of ferrous metal strips. No. 2,165,326. Charles W. Yerger and Guerin Todd, Matawan, N. J., to Hanson-Van Winkle-Munning Company, Matawan, N. J.

Iron alloy, containing 0.01-0.5% carbon, 0.025-0.500% vanadium, 0.08-0.50% phosphorus, 0.2-1.5% manganese, not over 3% copper, and not over 0.20% sulfur. No. 2,165,553. Daniel E. Krause and Clarence H. Lorig, Columbus, O., to Battelle Memorial Institute, Columbus, O.

Magnesium alloy, containing 41.0-43.5% aluminum, 26-30% zinc, 1.5-3.0% manganese, 3-6% nickel, 2-5% steel (Siemens-Martin), and 18-21% magnesium. No. 2,166,039. Fritz Christen, Zurich-Altstetten, Switzerland.

Electrical resistance wire, composed of from 60 to 80% platinum, from 10 to 30% palladium, and from 2 to 15% of one of the hardening metals, rhodium and ruthenium. No. 2,166,055. Carl Albert Henry Jahn, London, England, to Johnson Matthey & Company Limited, Hatton Garden, London County, England.

Froth flotation process for metallic ores, wherein the agent comprises a mixture of nitriles of saturated and unsaturated aliphatic compounds having at least 3 and not over 10 carbon atoms. No. 2,166,093. James Harwood and William O. Pool, Chicago, Ill., to Armour and Company, Chicago, Ill.

Paper and Pulp

Reproduction of designs, comprising application of a design formed of a soluble dye to a sheet having a uniformly distributed coating of a glycerin-miscible solvent. No. 2,163,934. Howard E. Collins, La Grange, Ill., to Ditto, Inc., Chicago, Ill.

Causticization of an alkali metal monosulfide solution with copper oxide. No. 2,164,141. Hugh Kelsea Moore, York Harbor, Maine, to Brown Company, Berlin, N. H.

Manufacture of paper from wheat, oat, or rye straw. No. 2,164,192. Arnold J. Marcham and Norris Reynolds, Carlyle, Ill., ten per cent. to Ben O. Zillman, St. Louis, Mo.

Petroleum

Process for vacuum steam distillation of heavy petroleum oil. No. 2,158,425. Edward G. Ragatz, to Union Oil Company of California, both of Los Angeles, Calif.

Catalytic process for manufacture of normally solid paraffins from carbon monoxide and hydrogen gases. No. 2,159,140. Johannes Eckell and Gerhard Ritter, Berlin, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Plasticizer for soluble cellulose ethers and esters, comprising one of the group including nitrated polymeric olefins of petroleum, having at least 6 carbon atoms. No. 2,160,133. Carleton Ellis, Montclair, N. J., to Standard Oil Development Co.

Heat-stabilizing compound for substantially saturated acyclic hydrocarbon polymers of high M. W., comprising 0.01-5.00% of a thiophenolic compound. No. 2,160,172. Raphael Rosen, Elizabeth and Robert M. Thomas, Union, N. J., to Standard Oil Development Co. of Delaware.

Process for stabilizing fatty oil polymers. No. 2,160,572. Egon Eichwald, Amsterdam, Netherlands, to Shell Development Co., San Francisco, Calif.

Process dewaxing mineral oils. No. 2,160,573. Bernard Sutro Greensfelder, San Francisco, and Monroe Edward Spaght, Long Beach, Calif., to Shell Development Co., San Francisco, Calif.

Process dehydrogenating hydrocarbons, essentially comprising stripping through a tube containing amphoteric alkaline earth oxides, at 900-1100 deg. F. No. 2,161,984. William J. Sweeney and William E. Spicer, Baton Rouge, La., to Standard Oil Development Co., a corp. of Delaware.

Method improving characteristics of a hydrocarbon oil by action of static electric discharges. No. 2,161,987. Joshua A. Tilton and Roger W. Richardson, Baton Rouge, La., to Standard Oil Development Co., of Delaware.

Process refining hydrocarbon lubricant oil crudes. No. 2,162,195. Bernard Sutro Greensfelder and Monroe Edward Spaght, Martinez, Calif., to Shell Development Co., San Francisco, Calif.

Thermal method for converting hydrocarbons. No. 2,162,300. James L. Farrell and Gerald A. Ibach, Whittenburg, Tex., to Phillips Petroleum Co., Bartlesville, Okla.

Method reducing sulfur content of cracked gasoline stocks. No. 2,162,319. Walter A. Schulze, Bartlesville, Okla., to Phillips Petroleum Co., a corp. of Delaware.

Method of burning oil as a spray fuel. No. 2,162,432. Charles B. Hillhouse, to Sylvia Remsen Hillhouse, both of New York City.

Closed continuous process for cracking petroleum crudes. No. 2,162,433. Charles B. Hillhouse, to Sylvia Remsen Hillhouse, both of New York City.

Process for sweetening sulfur-bearing petroleum distillates. No. 2,162,670. Robert E. Burk and Everett C. Hughes, to The Standard Oil Co., both of Cleveland, Ohio.

Method refining mineral oils, using a fluoride of the methylene series as the selective agent. No. 2,162,682. Ernst Terres, Berlin, Germany, and Josef Moos, New York, and Hans Ramser, Long Island City, N. Y., to Edeleanu Gesellschaft, m.b.H., of Germany.

Processing of petroleum distillates by a thermal method employing a solid catalytic adsorptive mass. No. 2,162,715. William Thornhill Hancock, Long Beach, Calif.

Processing of petroleum distillates by catalytic polymerization over a solid catalytic body. Nos. 2,162,716-7. William T. Hancock, Long Beach, Calif.

Method for protecting condenser tubes in oil refineries from corrosion due to acidic materials. No. 2,162,933. John C. Bolinger, West Hollywood, Wayne A. Howard, Whittier, and Park Wooley, Huntington Park, Calif., to Socony-Vacuum Oil Co., Inc., New York City.

Separation of sulfur-containing compounds from petroleum oils, comprising essentially a countercurrent extraction cycle with a solvent having a preferential action on the sulfur-bearing contaminants. No. 2,162,963. Donald S. McKittrick, Oakland, Calif., to Shell Development Co., San Francisco, Calif.

Method refining gasoline-type petroleum distillates, essentially comprising absorption of gum-forming compounds in an acid of phosphorus. No. 2,162,992. Waldo C. Ault and Carroll A. Hochwalt, Dayton, Ohio, to Monsanto Chemical Co., St. Louis, Mo.

Production of gasoline and synthetic crude oil from butane-kerosene mixtures. No. 2,163,113. Malcolm P. Youker, Bartlesville, Okla., to Phillips Petroleum Co., Bartlesville, Okla.

Petroleum hydrocarbon polymerization catalyst, comprising: natural phosphate rock, carnotite ore, zinc phosphate, and barium halide. No. 2,163,155. James R. Rose, Edgeworth, Pa.

Method for cracking petroleum hydrocarbons, comprising the passing of a molten metal through the cracking zone such that the gases have prolonged contact with the metal. No. 2,163,170. Salvatore A. Guerrieri, Mount Vernon, N. Y., to The Lummus Co., New York City.

Method removing asphaltic hydrocarbons from petroleum fractions. No. 2,163,245. Kenneth C. Laughlin, Baton Rouge, La., to Standard Oil Development Co., of Delaware.

Fractionation of petroleum distillates with solvent extraction by cinnamaldehyde. No. 2,163,269. Joseph A. Chenicek, to Universal Oil Products Co., both of Chicago, Ill.

Process for refining petroleum hydrocarbons. No. 2,163,275. Bernard J. Flock and Edwin F. Nelson, to Universal Oil Products Co., all of Chicago, Ill.

Separation of solvents from oil in miscella and like mixtures. No. 2,163,303. Michele Bonotto, Evansville, Ind., to Extractol Process, Ltd., Wilmington, Del.

Cracking process for petroleum hydrocarbons. No. 2,163,306. James W. Gray, Summit, N. J., to Gasoline Products Co., Inc., Newark, N. J.

Method removing sulfur compounds from petroleum crudes, comprising precipitation of the mercaptides with a solid contact mass impregnated with copper ion solution. No. 2,163,312. Walter A. Schulze, Bartlesville, Okla., to Phillips Petroleum Co., of Delaware.

U. S. Chemical Patents

Off. Gaz.—Vol. 502, Nos. 4, 5—Vol. 503—Vol. 504, No. 1—p. 125

Apparatus for feeding chemicals into the flow from an oil and gas well. No. 2,163,436. Gwynne Raymond, Oklahoma City, Okla., and Walden W. Mason, Kansas City, Mo.

Method dewaxing mineral oil, comprising essentially precipitation of the waxy constituents in an organic fluoride in which the oil is soluble. No. 2,163,564. Ernest Terres, New York, and Erich Saegebarth, Long Island City, N. Y., and Joseph Moos, Berlin-Mariendrof, and Hans Ramser, Berlin-Steglitz, Germany, to Edeleanu Gesellschaft m.b.H., Berlin, Germany.

Mineral oil lubricant, comprising petroleum oil containing more than approximately 0.75% of oil-soluble naphthenate. No. 2,163,622. George L. Neely and Frank W. Kavanagh, Berkeley, Calif., to Standard Oil Corp., San Francisco, Calif.

Apparatus for the separation of water and other foreign matter from crude oil emulsions. No. 2,163,804. Hermann Passler, Vienna, Austria, one-half to Albert Brunnbauer, Junior, Vienna, Austria.

Separation of hydrogen-deficient hydrocarbons from those of greater hydrogen content, employing a sulfur dioxide-olefine-resin. No. 2,163,858. Robert D. Snow, Bartlesville, Okla., to Phillips Petroleum Co., of Delaware.

Conversion of petroleum hydrocarbons into gasoline-type hydrocarbons, by a thermal process. No. 2,163,867. Edmund G. Borden, Little Neck, N. Y., to Power Patents Co., Hillside, N. J.

Process for refining fatty matters with a nitrogen-containing alkaline extractant. No. 2,164,012. Walter J. Hund, Oakland, and Ludwig Rosenstein, to Shell Development Co., all of San Francisco, Calif.

Method for dewaxing petroleum oils. No. 2,164,013. Vance N. Jenkins, Long Beach, Calif., to Union Oil Co., of California, Los Angeles, Calif.

Method for distillation of oils. No. 2,164,132. Henry L. Doherty, New York City, to Power Patents Co., Jersey City, N. J.

Filter structure designed to remove extremely finely-divided substances from aqueous suspensions, comprising a medium whose pores are of such size as to retain thereon precipitated calcium carbonate sludge, while permitting a free flow of aqueous media there through. No. 2,164,142. Hugh Kelsea Moore, York Harbor, Me., to Brown Co., Berlin, N. H.

A Diesel fuel improved with a minor proportion of a bis-(aminoaryl) disulfide. No. 2,164,151. George S. Crandall, Woodbury, and William H. James, Paulsboro, N. J., to Socony-Vacuum Oil Co., Inc., New York City.

Apparatus for the continuous distillation of high-boiling hydrocarbons to coke. No. 2,164,247. Alfred Knudsen, Astra (Chubut) Argentina, to "Astra" Compania Argentina de Petroleo Sociedad Anonima, Buenos Aires, Argentina.

Manufacture of gasoline from petroleum crudes. No. 2,164,293. Wayne E. Kuhn, Port Arthur, Tex., to The Texas Company, New York City

Production a motor fuel of improved antiknock value, comprising the chlorination of petroleum naphtha having a low antiknock value to yield a chlorinated product containing 5-20% chlorine by weight; latter product is then thermo-treated under pressure, followed by catalytic dechlorination, to yield finally a chlorine-free gasoline fraction of high antiknock value. No. 2,164,334. Ernest M. Marks, Lansdowne, Pa., to The Atlantic Refining Co., Philadelphia, Pa.

Method for reforming fuel gas, to yield a product suitable as an atmosphere for the bright-heat treatment of metals. No. 2,164,403. Robert G. Guthrie and Oscar J. Wilbur, to Peoples Gas By-Products Corp., all of Chicago, Ill.

Method for treating wells, comprising the injection into porous-strata oil wells a dispersion of an emulsifying agent in a substantially nonaqueous liquid, whereby water in the strata is emulsified, releasing pressure to cause flushing of the emulsified water into the well, removing liquids from the well, and then injecting into the well and surrounding strata a fluent material inert to oil and adapted to form a plugging precipitate in the presence of water. No. 2,164,459. Harvey T. Kennedy, Forest Hills, Pa., to Gulf Research & Development Co., Pittsburgh, Pa.

Method for refining petroleum oil bearing a minimal amount of impurity, essentially comprising the steam-distillation of the oil from the impurities. No. 2,164,593. Norman K. Rector, to Petroleum Engineering, Inc., both of Tulsa, Okla.

Continuous process for removing mercaptans from high-sulfur petroleum oils. No. 2,164,665. Thomas Hunton Rogers and Bernard Harvey Shoemaker, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Apparatus for the production of gaseous, unsaturated hydrocarbons. No. 2,164,762. Walter Baumann and Otto Hemman, Leuna, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Continuous method for removing wax and oil from petroleum stock containing waxy constituents, comprising counter-current treatment of the stock with a solvent composed of about 30% sulfur dioxide and about 70% ortho dichlorobenzene; wax-bearing and wax-free solutions accumulate, the latter containing substantially all of the oil. No. 2,164,769. Francis X. Govers, Vincennes, Ind., to Indian Refining Co., Lawrenceville, Ill.

Acid treatment of cracked gasoline distillates, comprising removal with dilute (55-57%) sulfuric acid of inherent, gummy impurities. No. 2,164,771. Marcus T. Kendall, Long Beach, Calif., to The Texas Co., New York City.

Method of separating wax-bearing and oil-bearing fractions arising from solvent extraction of crude petroleum oil. No. 2,164,773. Edwin C. Knowles, Beacon, N. Y., to The Texas Co., New York City.

Method recovering valuable constituents from petroleum refinery still tar. No. 2,164,776. Bernard Y. McCarty, Beacon, N. Y., to The Texas Co., New York City.

Method refining hydrocarbon oil by solvent extraction to separate the oil into fractions of different viscosity index. No. 2,164,777. Bernard Y. McCarty and Howard H. Gross, Beacon, N. Y., to The Texas Co., New York City.

Process recovering wax from wax-bearing mineral hydrocarbon oil, essentially comprising recovery of a filter cake from filter press extraction of the waxy fraction. No. 2,164,779. Robert E. Manley, Yonkers, N. Y., to The Texas Co., New York City.

Means of conditioning wax-bearing petroleum oil prior to chilling, comprising the addition to the batch of a quantity of tetranaphthyl, $C_{40}H_{26}$. No. 2,164,780. Ernest F. Pevere, Beacon, N. Y., to The Texas Co., New York City.

Process removing mercaptans from sulfur-containing petroleum oil. No. 2,164,851. David Louis Yabroff, Berkeley, and Ellis R. White, Albany, Calif., to Shell Development Co., San Francisco, Calif.

Production high-quality lubricating oil, comprising contacting with a polymerizing agent, selected from the group consisting of anhydrous aluminum chloride and the double compounds of that chloride with olefines, at a polymerizing temperature and in the presence of inert solvent, a gas essentially comprising ethylene, free of oxygen and sulfur and the compounds of these elements, being free from contact with iron. No. 2,165,372. Wolfgang Haag, Mannheim and Gerhardt Hofmann and Hermann Zorn, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Preparation of residual petroleum lubricating oil of high viscosity index from crude oil residual stocks, comprising distilling thereform under mild cracking conditions, the lower viscosity oil fractions and the cracked fractions produced during distillation until the residual oil, when freed from asphalt and wax, reaches a viscosity considerably in excess of 150 secs. Saybolt at 210 deg. F., and separating asphaltic and waxy impurities from the undistilled residue. No. 2,165,432. James M. Whiteley, Roselle, N. J., to Standard Oil Development Company, Delaware.

Conversion of normally gaseous hydrocarbons to hydrocarbons of different molecular weight, comprising the heating of said gaseous hydrocarbons and the separation therefrom of a methane-rich fraction; said fraction being converted into oxygenated compounds utilized to separate from the reaction mixture the naphtha fractions. No. 2,165,526. Harold V. Atwell, White Plains, N. Y., to Process Management Company, Inc., New York, N. Y.

Improvement of fuel oils of low grade, comprising their treatment with a hydrogenating gas in the presence of a large proportion of catalyst, such that from 0.1-1.0% hydrogen is added to the original content of hydrogen in the material. No. 2,165,940. Mathias Pier, Heidelberg, and Ernst Donath, Mannheim, Germany, to Standard-I. G. Company, Linden, N. J.

Production of lubricating oil from an uncracked wax distillate, comprising mixing said distillate with a solvent containing sufficient methyl ethyl ketone so that, at temperatures of about 100 deg. F., the solvent liquid has substantially complete solvent action on said distillate and at a temperature of zero deg. F., has substantially no solvent action on the waxy material contained therein; upon removal of said wax, and of said solvent, the distillate has a cold pour point substantially the same as the temperature of refrigeration to which the distillate is subjected for wax removal; mixture is refrigerated to a temperature approximately similar to the low pour point desired in the final product to form a pressable wax mixture, pumping said mixture into a filter press, and separating the wax. No. 2,165,949. Cary R. Wagner, Chicago, Ill., to The Pure Oil Company, Ohio.

Dewaxing process for heavy, residual, lubricating oil containing asphaltic and resinous impurities. No. 2,166,005. Frank W. Hall, New York, N. Y., to The Texas Company, New York, N. Y.

Pigments

Method regenerating spent decolorizing clay contaminated with tarry matter. No. 2,162,202. George Hugo von Fuchs, Wood River, Ill., to Shell Development Co., San Francisco, Calif.

Graphite writing leads containing ethyl ether of oxyquinoline. No. 2,162,311. Karl Kreutzer, Nuremberg, Germany, to J. S. Staedtler, Nuremberg, Germany.

Quick-drying printing ink, containing heat-reactive aminoplast resin, pigment, and a liquid vehicle in amount sufficient to produce a thixotropic mass at room temperatures. No. 2,162,331. Carleton Ellis, Montclair, N. J., to Ellis Laboratories, Inc., a corp. of New Jersey.

Enamel opacifying agent, consisting of a basic sulfate of cerium together with one of the group consisting of alkali and alkaline earth silicates, and aluminum silicates. No. 2,163,334. Ludwig Weiss, Frankfort-on-the-Main, Germany, to Deutsche Gold und Silber Scheide-Anstalt, vormals Roessler, Frankfort-on-the-Main, Germany.

Manufacture hydrate-free calcium sulfate pigments. No. 2,163,385. Roy W. Sullivan, Richardson Park, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Ceramic opacifier, comprising zinc oxide as added to ceramic compositions containing zinc sulfide. No. 2,163,516. Raymond William Hannagen, Cardiff, Wales.

Manufacture of carbon black, by combustion of a hydrocarbon-containing gas. No. 2,163,630. Forrest C. Reed, Kansas City, Mo.

Manufacture a colored roofing granule. No. 2,163,678. Henry R. Gundlach, Baltimore, Md., to Central Commercial Co., of Illinois.

Processing of carbon black pigment materials. No. 2,164,164. Howard W. Price, Borger, Tex., to J. M. Huber Corp., Borger, Tex.

Manufacture an improved luminescent material. No. 2,164,533. Humboldt W. Leverenz, Collingswood, N. J., to Radio Corp. of America, of Delaware.

Preparation of enamels of high resistance to variation of temperature, comprising the addition of substantially pure silicic acid, fused and then cooled to solidification, to the components of said enamel. No. 2,165,134. Karl Frank, Bad Soden in Taunus, and Fritz Osterloh, Frankfort-on-the-Main-Hochst, Germany, one-half to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany, and one-half to Eisenwerk Kaiserslautern, Kauserslautern, Germany.

Vitreous enamel frit made from cryolite-free raw materials containing silicates, borates, alkali metal compounds and fluorides, the latter being introduced into the raw mixture by means of a fluosilicate, so as to furnish about 10-12% fluorine by weight of the total weight of said raw material, and the ratio of alkali to boric acid, excluding the alkali content of the fluorine compounds, whereby the said frit is rendered suspendible in water with a minimum amount of clay addition and without excessive grinding. No. 2,165,554. Ignaz Kreidl, Vienna, Austria, to Vereinigte Chemische Fabriken Kreidl, Heller & Co., Nfg., Vienna, Germany.

Resins, Plastics, etc.

Process preparing ester condensation products from the reaction of a saturated ester with a ketone, in the presence of the hydride of a metal from the group consisting of alkai and alkali earth metals, said ketone having a carbon atom adjacent to the carbonyl group, which carbon atom having at least one hydrogen atom attached thereto and being essentially aliphatic in reaction. No. 2,158,071. Virgil L. Hansley, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Resiniferous material, the reaction product of a mixture of rubber and a terpene exposed to action of hydrogen halide. No. 2,158,138. John McGavack, Leonia, N. J., to United States Rubber Co., New York City.

Brittle, fusible resin, the reaction product of a phenol and a methylene compound formed in the presence of a small quantity of ammonia and a somewhat greater amount of rosin. No. 2,158,366. Norman D. Han-

U. S. Chemical Patents

son, Bloomfield, N. J., and Ernest Kritzmacher, Manchester, Conn., to Bakelite Corporation, New York City.

Cork composition, being granulated cork incorporated with rubber bodied tung oil, protein adhesive, a resinous binder, and a plasticizer. No. 2,158,469. Charles E. McManus, Spring Lake, N. J., to Crown Cork & Seal Co., Inc., Baltimore, Md.

Method of stabilizing polyvinyl acetal resins, consisting of subjecting to action of nitrous acid a solution of a compound of the group comprising the resins and the polyvinyl intermediates which are used to prepare them. No. 2,159,263. Charles R. Fordyce and Martti Salo, to Eastman Kodak Co., all of Rochester, N. Y.

Condensation products obtained from the treatment of waste sulfite liquors with phenols and formaldehyde; products obtained have resinous properties, are alcohol soluble, and slightly soluble in weak alkali. No. 2,159,411. Fredrick J. Wallace, Brooklyn, N. Y., to Robeson Process Co., New York City.

Method softening nitrocellulose plastic sheets. No. 2,159,926. Julius F. T. Berliner, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production thermo-setting powder, from natural horn material treated with urea and an aldehyde. No. 2,159,981. Stefan Bakonyi, Dessau, Germany, to O. Kraus, Prague, Czechoslovakia.

Manufacture porous, voluminous polymers from a member of the group consisting of acrylates and their homologues. No. 2,160,054. Walter Bauer and Hellmuth Lauth, Darmstadt, Germany, to Rohm & Haas Co., Philadelphia, Pa.

Resinous material, made from the condensation of alkylene and polyalkylene sulfonamides with formaldehyde. No. 2,160,196. Herman A. Bruson and John W. Eastes, to The Resinous Products & Chemical Co., all of Philadelphia, Pa.

Oil-resistant plastic composition, comprising milling cured alkyd resin on mixing rolls until a strong sheet is formed, milling plastic polymers of chloroprene until broken down, and then milling together the two materials which are finally heat-cured. No. 2,160,230. Moyer M. Safford, Schenectady, N. Y., to General Electric Co., of N. Y.

Method polymerizing naphtha-soluble materials with a phenolic compound, in the presence of activated clay. No. 2,160,537. William H. Carmody, to The Neville Corp., both of Pittsburgh, Pa.

Manufacture a polymer of monomeric vinylidene chloride, polymer being substantially insoluble in chloroform, carbon bisulfide, ethylene bromide, or benzine, sparingly soluble in tetrachlorethane and resistant to acids and alkalies at room temperature. Nos. 2,160,903-4. John H. Reilly and Ralph M. Wiley, to The Dow Chemical Co., all of Midland, Mich.

Method polymerizing monomeric vinylidene chloride to a granular, moldable plastic powder, comprising polymerization of the chloride in a relatively small amount of inert solvent miscible with said chloride which is the only polymerizable material present. No. 2,160,936. John H. Reilly and Charles R. Russell, to The Dow Chemical Co., all of Midland, Mich.

Process for polymerization vinylidene chloride, comprising the solution of from 50-15 parts chloride in an inert water-immiscible liquid (50-85 parts) to form a gel having a liquefaction temperature of about 143-145 deg. C.; said liquid to have boiling point above about 145 deg. C.; gel is heated above liquefaction point and cast into a film, the insert solvent then being removed from said film. No. 2,160,937. John H. Reilly, to The Dow Chemical Co., both of Midland, Mich.

Co-polymers of vinylidene chloride with one of the group comprising unsaturated esters of the type including 2-methyl-allyl, 2-chloroallyl, crotonyl, and cinnamyl esters of dicarboxylic acids. No. 2,160,940. Edgar C. Britton, Clyde W. Davis, and Fred Lowell Taylor, to The Dow Chemical Co., all of Midland, Mich.

Co-polymers of vinylidene chloride with one of the group consisting of lower alkyl esters of acrylic acid and its homologs. No. 2,160,945. Ralph M. Wiley, to The Dow Chemical Co., both of Midland, Mich.

Plastic composition, being prepared by mixing with a polyethylene sulfide type plastic, a polymerized isobutylene compound having an average M. W. above 800. No. 2,160,995. Peter J. Wiezevich, Elizabeth, N. J., by judicial change of name to Peter J. Gaylor, to Standard Oil Development Co., of Delaware.

Plastic composition, having oxidation-stable, non-tacky properties, suitable for molding, comprising a vinyl polymer and vinyl acetate intimately mixed with polymerized isobutylene having an average M. W. of above 800. No. 2,160,996. Peter J. Wiezevich, Elizabeth, N. J., by judicial change of name to Peter J. Gaylor, to Standard Oil Development Co., of Delaware.

Moldable plastic composition, comprising polymerized chloroprene intimately mixed with polymerized isobutylene of average M. W. above 800. No. 2,160,997. Peter J. Wiezevich, Elizabeth, N. J., by judicial change of name to Peter J. Gaylor, to Standard Oil Development Co., of Delaware.

Alkali-soluble resin for photographic antihalation layer on photographic films; said resin having the acid groups in the form of the anhydride. No. 2,161,788. Gustav Wilmanns, Wolfen, Bitterfeld, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Method dispersing insoluble coloring matter throughout a resinous plastic mass, essentially comprising co-precipitation of the coloring matter with the resin, from a solvent mixture thereof. No. 2,161,803. Emile C. de Stubner, Charleston, W. Va.

Manufacture of resinous solids from naphtha crudes. No. 2,161,951. William H. Carmody, to The Neville Co., both of Pittsburgh, Pa.

Manufacture a resin having plastic flow under the action of heat and pressure, of improved molding properties. No. 2,162,035. Fritz Seebach, Erkner, near Berlin, Germany, to Bakelite Corp., New York City.

Manufacture a non-yellowing resin, the condensate of formaldehyde and a 1-alkyl-1-para-hydroxy-phenylcyclo-paraffin. No. 2,162,172. Herbert Honel, Vienna, and Alois Zinke, Graz, Austria, to Helmuth Reichhold, Detroit, Mich.

Manufacture of artificial resins, by inter-condensing aldehyde, and then hydrogenating the resultant product. No. 2,162,616. Willy O. Hermann, Deisenhofen, and Hans Deutsch and Bruno von Zychlinski, Munich, Germany, to Chemische Forschungagesellschaft, m.b.H., Munich, Germany.

Artificial resin substantially identical with the reaction product of polyvinyl alcohol and butyraldehyde which, when plasticized with triethylene glycol di (2-ethyl butyrate), yields a plastic composition having at ordinary temperatures an elongation of at least 200% and an ultimate strength of at least 2,000 p.s.i. No. 2,162,678. Harold F. Robertson, Coraopolis, Pa., to Carbide and Carbon Chemicals Corp., of New York.

Artificial resin substantially identical with the reaction product of polyvinyl alcohol and propionaldehyde which, when plasticized at ordinary temperatures with triethylene glycol di- (2-ethyl butyrate), yields a plastic composition having an elongation of at least 200% and an ultimate strength of at least 2,000 p.s.i. No. 2,162,679. Harold F. Robertson, Coraopolis, Pa., to Carbide and Carbon Chemicals Corp., of New York.

Artificial resin substantially identical with the reaction product of polyvinyl alcohol and valeraldehyde which, when plasticized with triethylene glycol di- (2-ethyl butyrate) at ordinary temperatures, yields a plastic composition having an elongation of at least 200% and an ultimate strength of at least 2,000 p.s.i. No. 2,162,680. Harold F. Robertson, Coraopolis, Pa., to Carbide and Carbon Chemicals Corp., of New York.

Machine manufacturing hollow plastic shapes. No. 2,163,118. Erik Valdemar C: son Fejmert, Nykoping, Sweden.

Self-hardening plastic material, derived from paracoumarone resin and chlorinated rubber, both of which are impregnated upon an inert filler. No. 2,163,243. John A. Kenney, Plainfield, N. J., to The Barrett Co., New York City.

Manufacture of fusible plastics from solid urea and solid polymeric formaldehyde. No. 2,163,264. Otto Sussenguth, Erkner, near Berlin, Germany, to Bakelite Gesellschaft mit beschrankter Haftung, Berlin, Germany.

Manufacture of granular acrylate polymers, wherein the polymerizing aqueous medium contains a starch compound (methyl starch) soluble in water; said starch ether acts as dispersant and is later removable by adding a starch hydrolytic enzyme. No. 2,163,305. Harry R. Dittmar, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture of polyamides. No. 2,163,584. Wallace H. Carothers and George D. Graves, to E. I. du Pont de Nemours & Co., all of Wilmington, Del.

Manufacture an adhesive composition from magnesia, zinc oxide, and a plastic, polymerized chloroprene all mixed with an appropriate solvent. No. 2,163,610. Alexander D. Macdonald, Malden, Mass., to B. B. Chemical Co., Boston, Mass.

Manufacture a liquid vulcanizable cement from plastic polymerized chloroprene. No. 2,163,612. Alexander D. Macdonald, Malden, Mass., to B. B. Chemical Co., Boston, Mass.

Manufacture of polyamides. No. 2,163,636. Edgar William Spanagel, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Phenolic resin, comprising the reaction product of a preformed oil-soluble phenolic resinous condensate from a substituted phenol and an aldehyde, and an aliphatic hydrocarbon resin. No. 2,163,637. Charles A. Thomas, Dayton, Ohio, to Monsanto Chemical Co., of Delaware.

Apparatus for continuously mixing and transporting fibrous materials and binders. No. 2,164,044. Johannes Steinert, Hanover, Germany, to Dr. Ing. e.h. Eduard Dyckerhoff, Bluemenau, near Wunstorf, Germany.

Manufacture an abrasive article comprising a resin and granules with surfaces of low adhesive characteristics with respect to said resin, comprising the mixing of the particles with a resin of the phenol-formaldehyde type, setting the mixture under heat and pressure, disintegrating the resultant mass and separating the granules with adhering resin; the last-named are incorporated with a resin bond, under heat and pressure, to form a substantially non-porous article. No. 2,164,476. Arthur G. Scutt, to The Carborundum Co., both of Niagara Falls, N. Y.

Manufacture of an oil, grease and hydrocarbon-resistant fibrous material, comprising a fibrous base having 2 superimposed flexible coatings; the first coating, next to the fibrous base, being highly resistant to moisture and consisting essentially of plasticized cellulose derivative, the second being a water-miscible, organic binder of the group consisting of protein glues and water-soluble gums plasticized with a polyhydric alcohol containing at least 50% sorbitol. No. 2,164,494. Kenneth R. Brown, Tamaqua, Pa., and Edmond H. Bucy, Stamford, Conn., to Atlas Powder Co., Wilmington, Del.

Resinous product derived by the heat treatment of a mixture of lactic acid and ammonium lactate, said product being a waxy solid at 25 deg. C., and a clear liquid at 90 deg. C. No. 2,165,090. Frank M. Clark and Ralph A. Ruscetta, Pittsfield, Mass., to General Electric Co., of New York.

Plastic composition of matter, adapted for formation into useful products by, molding, extrusion or the like, comprising largely a joint precipitate of calcium sulfate and iron hydroxide. No. 2,165,344. Henry Seymour Colton, Shaker Heights, Ohio, to H. Seymour Colton, M. J. Rentschler, and James A. Weeks, as trustees.

Plasticized composition, comprising a condensation derivative of rubber and an amyl cyclohexane. No. 2,165,951. Charles F. Winans, Akron, Ohio, to Wingfoot Corporation, Wilmington, Del.

Rubber

Production molded rubber shapes from liquid rubber dispersions. No. 2,161,281. Mitchell Carter, Trenton, N. J., to Rubber Products, Inc., Chicago, Ill.

Production rubber hydrochloride films. No. 2,161,454. William C. Calvert, Chicago, Ill., to Wingfoot Corp., Wilmington, Del.

Concentration of latex by evaporation from a solution containing a di-alkali metal salt of a phosphoric acid ester of a higher aliphatic primary alcohol. No. 2,161,455. Albert M. Clifford, Stow, Ohio, to Wingfoot Corporation, Wilmington, Del.

Method for concentration of latex, comprising mixing the latex with colloid dispersed in soap solution, and centrifuging the mixture, thereby separating the lighter cream layer. No. 2,161,731. Nicolaas Hendrik van Harpen, Medan, Sumatra, Netherlands, East Indies, to Algemeene Vereeniging Van Rubberplanters Ter Oostkust Van Sumatra, Sumatra, Netherlands, East Indies.

Composition of matter, a rubber ball article consisting of rubber, balata, and a co-polymer vinyl compound. No. 2,161,934. Willis E. Reichard, Elyria, and Robert R. Olin, Akron, Ohio, to The Worthington Ball Co., Elyria, Ohio.

Processing of titanium dioxide pigment material, involving mixing the dioxide with aqueous basic aluminum salt. No. 2,161,975. Karl Walter Petersen, Stockholm, Sweden, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Water and oil resistant composition having a body of fibrous cellulosic matter coated on both sides with crystalline rubber hydrochloride, one of which sides is further coated with a superficial layer of amorphous rubber hydrochloride. No. 2,162,769. Floyd E. Williams, to Marbon Corp., both of Gary, Ind.

Manufacture a chlorinated rubber-drying oil resiniferous composition suitable for linoleum or the like. No. 2,162,924. Donald H. Spitzli, Arlington, and Reeves L. Kennedy, Plainfield, N. J., to Congoleum-Nairn, Inc., of New York.

Production of rubber hydrochloride, consisting of forming a solution of about 10 parts raw rubber in about 500 parts benzol, adding 0.1-0.5 part of stannic choride to said solution, and causing hydrogen chloride gas to be introduced into said mixture. No. 2,164,140. Gengo Mochizuki,

State of Chemical Trade

Off. Gaz.—Vol. 502, Nos. 4, 5—Vol. 503—Vol. 504, No. 1—p. 127

Shiba-Ku, Tokyo, Japan, one-half to Masataro Konishi, Saitama-ken, Japan.

Manufacture a solvent, oil- and water-resistant rubber hydrochloride composition. No. 2,164,367. Herbert A. Winkelmann and Eugene W. Moffett, Chicago, and William C. Calvert, Oak Park, Ill., to Marbon Corp., a corp. of Delaware.

Preparation of rubber solutions from rubber slabs, comprising the shredding of the slabs and their subsequent kneading and agitation in a vessel with an appropriate solvent, to form a solvent, spongy mass. No. 2,164,400. Edwin O. Groskopt, Rutherford, N. J., to The Patent & Licensing Corp., New York City.

Composition of matter substantially free of the balata hydrocarbon and comprising vulcanized rubber latex, and flu avil substantially unchanged by interaction with sulfur. No. 2,165,589. Henry B. Townsend, Belmont, Mass., to Vultex Chemical Company, Cambridge, Mass.

Method of retarding the deterioration of rubber compositions, comprising the treatment of the same with a 1, 2-dihydroquinoline having a methyl group and an alkyl radical in the 2-position, an alkyl radical in the 4-position, and a member of the group consisting of the alkoxy and aroxy radicals in the 6-position. No. 2,165,623. Raymond F. Dunbrook and Bingham J. Humphrey, Akron, Ohio, to The Firestone Tire & Rubber Company, Akron, Ohio.

Production of chlorinated rubber in the form of a precipitate of high apparent density, comprising precipitating a chlorinated rubber from a carbon tetrachloride solution by introducing said solution into agitated water maintained at a temperature not less than 158 deg. F., and not greater than 175 deg. F., thereby producing a chlorinated rubber in the form of discrete particles having an apparent bulk density within the range of about 8-15 lbs. per cu. ft. when dry. No. 2,165,682. Raphael L. Stern, New Brunswick, N. J., to Hercules Powder Company, Wilmington, Del.

Textiles

Method increasing the resiliency of cellulose-base fabric, wherein the material is impregnated with a solution in absolute methanol of a urea-formaldehyde-base resin. No. 2,161,805. Henry Dreyfus, London, Donald Finlayson and Richard Gilbert Perry, Spondon, near Derby, England, to Celanese Corp. of America, of Delaware.

Process for improving crush and crease resistance in textiles, comprising the incorporation in the material of an aldehyde-amine-base resinous compound. No. 2,161,808. Donald Finlayson and Richard Gilbert Perry, Spondon, near Derby, England, to Celanese Corp. of America, of Delaware.

Recovery of copper from spent cuprammonium rayon lyes. No. 2,162,176. Ernst Kuss, Oskar Emert, and Andreas Hake, Duisburg, Germany, one-half to Duisburger Kupferhuette, Duisburg, Germany, and one-half to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method improving artificial cellulose-base fabrics, comprising treating said materials with aqueous solution of organic base, wherein an aromatic group is linked to a basic nitrogen through an aliphatic group. No. 2,162,881. Henry Dreyfus, London, and Robert Wighton Moncrieff and Frank Brentnall Hill, Spondon, near Derby, England, to Celanese Corp. of America, a corp. of Delaware.

Textile sizing assistant, comprising an alcohol derived from one of the natural resins including colophony, copal, dammar, abietic acid, and talloil resins; said alcohol being applied in non-drying organic solvent. No. 2,163,068. Kurt Stickdorn and Richard Hueter, Dessau-Rosslau, Anhalt, Germany, to Deutsche Hydrierwerke, Germany.

Method fixing dyestuffs on fabric comprising prior impregnation of the material with formaldehyde in the presence of an isocyclic sulfonic acid, said impregnation affording a fixative surface for the dyestuff. No. 2,163,204. Louis Amedee Lantz and William Stuart Miller, Manchester, England, to The Calico Printers Association, Ltd., Manchester, England.

Process producing formed artificial structures, comprising acting upon cellulose in the presence of an alkali, with at least one halogenated organic substance. No. 2,163,607. Leon Lilienfeld, Vienna, Austria.

Manufacture cellulose ethers, comprising treating cellulosic materials with a quaternary substituted ammonium base, and then reacting so-treated materials with an etherifying agent. No. 2,163,723. William Whitehead, Cumberland, Md., to Celanese Corp. of America, of Delaware.

Treating of textile materials, containing animal fibers, comprising oiling the material with an oil of viscosity between 250 and 500 seconds Redwood. No. 2,164,235. Walter Garner, Menston-in-Wharfedale, England.

Method of treating textiles, comprising impregnating the fabric with partially destearinized, polymerized arachis oil. No. 2,164,236. Walter Garner, Menston-in-Wharfedale, England.

Treatment of textiles, comprising oiling the material with oxidized ester containing a cyclohexanol nucleus and a fatty acid radical having more than 8 carbon atoms. No. 2,164,237. Walter Garner, Menston-in-Wharfedale, England.

Manufacture of laminated fabrics, comprising the treatment of cellulosic fabric, in the presence of alkali, with an alkylene oxide compound. No. 2,164,248. Leslie Gordon Lawrie, Reginald John William Reynolds, and Eric Everard Walker, Blackley, Manchester, England, to Imperial Chemical Industries, of Great Britain.

Dispersing, wetting, cleansing and softening agents suitable for the textile industry, consisting essentially of an ether of one glycol selected from the group consisting of diethylene glycol and triethylene glycol, one hydroxyl group thereof being etherified with a saturated aliphatic radical free from hydroxyl groups and containing at least 8 carbon atoms. No. 2,164,431. Conrad Schoeller, Ludwigshafen-on-the-Rhine, and Joseph Nuesslein, Frankfort-on-the-Main-Hochst, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany, a corp. of Germany.

Method for improving the strength of creped artificial silks. No. 2,164,479. Alfred E. Sunderland, Asheville, N. C., to American Enka Corp., Enka, N. C.

Process of imparting hydrophobic properties to cellulose fibers by impregnation of the fibers with a solution of a complex urea derivative. No. 2,165,265. Franz Emil Hubert, Dessau-Ziebigk, Erwin Heisenberg, Leipzig, and Adolf Steindorff and Ludwig Orthner, Frankfort-on-the-Main, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on- the-Main, Germany.

Process of conditioning yarn to render it more adaptable to textile operations, comprising applying thereto a lubricating and softening composition containing an acetal of tetrahydrofurfural. No. 2,165,352. Joseph B. Dickey and James B. Normington, Rochester, N. Y., to Eastman Kodak Company, Rochester, N. Y.

Process for conditioning yarn to render it more readily manageable in textile operations, comprising the application thereto of acetal esters of cyclic aldehydes containing oxygen in the nucleus. No. 2,165,353. Joseph B. Dickey and James B. Normington, Rochester, N .Y., to Eastman Kodak Company, Rochester, N. Y.

Treatment of textile material, comprising converting a solution containing dissolved cellulosic material into a lather, and applying said lather to a textile material. No. 2,165,392. Leon Lilienfeld, Vienna, Austria.

Preparation of a laminating fabric for adhesively uniting the components in a composite fabric, comprising the steps of applying to a fabric containing yarns of an organic derivative of cellulose a plasticizer, and ageing the fabric at about 40 deg. C., for from 66-90 hours, to cause the plasticizer to migrate from the cellulose yarns to the organic derivative of cellulose yarns. No. 2,165,506. Herbert Platt, Cumberland, Md., and Arthur Bruce Snowden, Hilldale, N. J., to Celanese Corporation of America, Delaware.

Process of treating vegetable fibers, comprising subjecting the fibers to treatment in a bath consisting of a mixture of fatty acid, a degumming and softening agent, a caustic material, and kerosene oil. No. 2,165,758. John R. Milson, Mansfield, Mass.

Water, Sewage, etc.

Electrical treatment of water, for the purpose of reducing the hardness thereof. No. 2,161,933. Albert John Pierpoint and Reginald Henry Crouch, London, England.

Process for the de-acidification of water, comprising the passing of free-acid-containing water over extensive keratin-containing substance. No. 2,164,156. Otto Liebknecht, Neubabelsburg, near Berlin, Germany, to the Permutit Company, N. Y. City, a corp. of Delaware.